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ABSTRACT

Provided in this document are case studies of representative and exemplary innovative environmental education programs from various regions of the world (North America, Latin America, Western Europe, Eastern Europe, Africa, Asia, and Australia/Oceania). The case studies provide information on the environment and environmental problems and concerns of various countries, insights into that country's attitude toward the environment and education, and models of programs created for that country's situation. Many of them incorporate international cooperation or a global perspective. The opening section provides a philosophical overview of environmental education and strategies to promote environmental education internationally. Major sections which follow address multinational, national, community, and single-institution programs. Multinational programs are those which involve institutions, organizations, or governments of more than one country. National programs are single programs intended for use throughout a nation. Community programs occur in one community or localized area of a country, and focus on that community's environment. Single-institution programs are undertaken at one school, university, or museum. Case studies are also categorized in a matrix found in the introduction to the document. Programs are arranged by world region, target audience, environmental/education emphasis, and sponsor in the matrix. (JN)

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Selected and Edited by
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ENVIRONMENTAL EDUCATION IN ACTION V:
INTERNATIONAL CASE STUDIES IN ENVIRONMENTAL EDUCATION

SE039605

ERIC Clearinghouse for Science, Mathematics,
and Environmental Education
The Ohio State University
College of Education and
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1200 Chambers Road, Third Floor
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December 1982

ENVIRONMENTAL EDUCATION INFORMATION REPORTS

Environmental Education Information Reports are issued to analyze and summarize information related to the teaching and learning of environmental education. It is hoped that these reviews will provide information for personnel involved in development, ideas for teachers, and indications of trends in environmental education.

Your comments and suggestions for these publications are invited.

John F. Disinger
Associate Director
Environmental Education

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DEDICATION

We would like to dedicate this book to the many practitioners of environmental education in the world today who have given so much of themselves to help produce an informed, concerned, and active citizenry. We can move governmentally in environmental affairs as rapidly as we can produce individuals who are willing to strive for quality environment, through their political, consumer, and direct actions upon the environment.

Special recognition should be given to the United Nations Educational, Scientific, and Cultural Organization (Unesco), the United Nations Environment Program (UNEP), the International Union for Conservation of Nature and Natural Resources (IUCN), and other governmental and non-governmental organizations that have played important professional roles in promoting environmental education. Many of the case studies selected for this book resulted from the efforts of the above organizations.

We would also like to express our appreciation to Gloria Stapp and Lori Kincaid. We are indebted to Gloria Stapp for assistance in the production of the book and for the undiminishing support she offered us both throughout the process. Lori Kincaid deserves special recognition for handling the correspondence and logistics, and commendation for the dedicated, professional manner with which she carries out her work.

Margaret E. Cowan
William B. Stapp

December 1982

ABOUT THE EDITORS

Margaret E. Cowan is Director of the Marine Education Division of the Alaska Sea Grant College Program at the University of Alaska, Fairbanks. She has worked in environmental education as a teacher, naturalist, curriculum writer, consultant, inservice instructor and program director. These experiences with environmental education programs and curricula have taken her across the United States from the Florida Everglades to interior Alaska, and associated her with school districts, educational foundations, the federal government and state environmental organizations. She is currently also writing and editing the Alaska Sea Week Curriculum Guide Series.

William B. Stapp is Professor of Natural Resources and Chairperson of the Behavior and Environment Program, School of Natural Resources, The University of Michigan. He served as the first Director of Unesco's International Environmental Education Program, and is past-President of the American Nature Study Society, President-elect of the National Association of Environmental Education Association, and recent recipient of a Senior Fulbright Fellowship to Australia. His books in the field include:

Environment and the Citizen: Opportunities for Effective Action;

Environmental Education: Strategies Toward a More Liveable Future;

Environmental Education Instructional Materials;

Environmental Education Activities Manual;

Environmental Education Needs and Priorities: A World Survey; and

Integrating Conservation and Outdoor Education into the Curriculum.

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PREFACE

The papers in this volume were solicited by the editors, based in large part on contacts made by Dr. Stapp during his period of service as Chief of Unesco's Environmental Education Unit and subsequent international activity over the past decade. An attempt was made to secure studies from a broad spectrum of nations and regions with a wide range of emphases. Most of the papers were written specifically for this compendium on request.

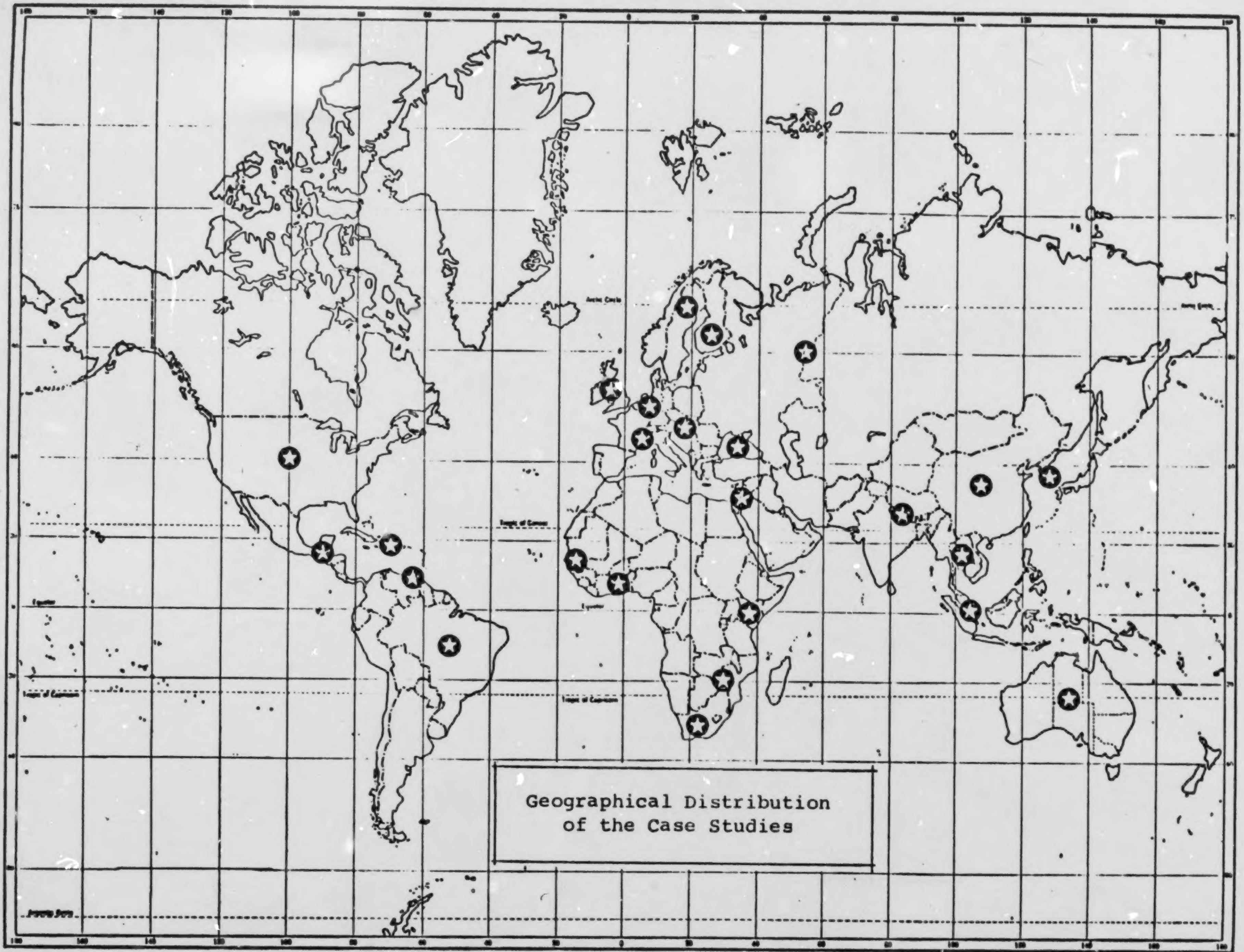
This volume is the fifth in ERIC/SMEAC's Environmental Education in Action series. Earlier volumes include:

> Environmental Education in Action I: Case Studies of Selected Public School and Public Action Programs, by Clay Schoenfeld and John Disinger, January 1977;
>
> Environmental Education in Action II: Case Studies of Environmental Studies Programs in Colleges and Universities Today, by Clay Schoenfeld and John Disinger, February 1978;
>
> Environmental Education in Action III: Case Studies of Public Involvement in Environmental Policy, by Clay Schoenfeld and John Disinger, December 1978; and
>
> Environmental Education in Action IV: Case Studies of Teacher Education Programs for Environmental Education, by Mary Lynne Bowman and John F. Disinger, December 1980.

A sixth entry in the series, Environmental Education in Action VI: Change Agents in and for Environmental Education, by John F. Disinger, is currently in preparation.

John F. Disinger
Associate Director
ERIC/SMEAC

December 1982



Geographical Distribution
of the Case Studies

INTRODUCTION

Our environment is a rich fabric of interwoven threads and complex interrelationships, a fascinating home. Today our relationship with our home is focused on the problems we have imposed on the earth. At its conception, environmental education was motivated by awe and a search for understanding. Environmental education at that time was nature-oriented, exploring the marvels, intricacies and nuances of our sustaining treasure. Now, we are overwhelmed by the magnitude, number and severity of environmental problems. Environmental education accepts the challenge of these problems and tries to provide knowledge and skills, and to guide the learner to attitudes that will result in a citizenry capable of making the decisions necessary to solve these problems.

No place on our planet is untouched by pollution, contamination, deterioration or degradation of resources. Our environmental ills have reached a level of severity to stimulate worldwide attention and concern. In response to this concern, government officials and world leaders met in Stockholm in 1972 to discuss our environmental plight and to make recommendations to help resolve environmental issues. This meeting, recognizing the necessity of education, mandated United Nations involvement in environmental education, resulting in a similar intergovernmental conference on environmental education in 1977. The case study by William Stapp on Unesco's efforts to further environmental education delineates the nature of our environmental problems and the role of Unesco since 1977.

The environmental problems which have attracted attention and concern are only symptoms of the root causes. These causes are socio-economic in nature and are founded on people's attitudes and values. The solutions of the problems will be found in educational systems and programs that address these underlying attitudes.

Environmental Education Development and Components

The focus in teaching about the environment is linked with people's perception and definition of that environment. As people were first interested in and then concerned about the environment, "environment" was synonymous with the natural world. The global emphasis up to the sixties was largely on studying and saving the natural world. By the late sixties, "environment" had broadened in meaning. At that time, Wang (1960) acknowledged this new trend by defining environmental science as "the horizontal science which considers all conceivable and/or measurable components affecting man as an individual and his society as a whole." He classifies these components as physical, biological, socio-economic and behavioral, and emphasizes the correlations among them. Environmental education eclipses all these components, dealing with both the natural world and human environments of more recent concern.

The total environment, natural and human-built, is of concern to educators. The present scope of the movement and its range of emphasis are reflected in the case studies included in this volume. The organizational structure outlined in the matrix (pp. ix-x) designates programs as either primarily concerned with the natural environment and its ecology, natural resources and their conservation, outdoor education, or the human environment. In each of these categories there is a dual focus on the environment of concern and educational approach emphasized.

The first category in the matrix is the natural environment and nature study. The wonder of the environment, an understanding of the intricacies and marvels of the relationships, and appreciation can lead to caring. Gerhard Schaefer (1980) was cognizant of the importance of including instruction about the natural world when he defined environmental education as "...the development of an understanding of the biosphere." Such environmental education programs today emphasize ecology and its principles. These programs are rooted in the traditions of nature study which have as their mission understanding the "vast pulsing harmony of our natural environment" (Swan, 1975). The goals of nature study are reflected in the purpose statement of the American Nature Study Society (Swan, 1975):

1. to develop appreciation and understanding of nature through firsthand experience in the out-of-doors,

2. to support the conservation of natural areas and encourage their use in nature education, and

3. to improve the quality of nature interpretation in schools, parks, literature and nature organizations.

This orientation to the natural environment has been traditionally linked with an experiential, inquiry and discovery approach to learning. Both of these emphases are reflected in program cases in this volume such as Australia's Community-Based Science Project for Aboriginals.

The next category is natural resources and conservation education. Programs such as Nepal's efforts at education about deforestation and Kenya's program on desertification for nomads focus on the wise use and management of natural resources. Today's energy education programs reflect this orientation to management and use of natural resources. Conservation education programs deal with resource degradation, importance and management, and define this category in the matrix. The innovation in conservation education is the use of current problems in the schools, exemplified by programs such as Germany's "Lignite Mining Case Study" (Swan, 1975). The trend of including problem-solving and decision-making skills in the study of the environment and its problems is also derived from conservation education and the concern for wise management.

Nature study and conservation education both reflect an orientation toward aspects of the total environment and emphasize a particular teaching methodology. Outdoor education, a third category, while

ORGANIZATIONAL MATRIX

	World Region							Target Audience								Emphases				Sponsoring Group						
	Western Europe	North America	Latin America	Eastern Europe & USSR	Africa	Asia	Australia & Oceania	Formal - pre-school	primary	secondary	tertiary	teacher education	Non-formal - youth groups	general public	specific adult groups	Natural Environment/Nature Study, Ecology	Natural Resources/Conservation Education	Outdoor Education	Human Environment	International Organization	National Government	National Organization	Local Government	Local Organization	Private Institution or Company	University
FOUNDATIONS/STRATEGIES																										
Stapp	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
Aho	X							X	X																	
Kostova				X					X	X						X	X	X			X					
Laptev				X				X	X	X	X	X	X	X	X		X	X			X					
Huen-pu						X		X	X	X	X	X	X	X	X		X	X	X		X					
Jakowska			X						X	X				X					X	X	X	X				
Lim						X		X	X	X	X	X	X	X	X		X		X		X					
Kim						X			X	X			X						X		X					X
Sakya						X		X	X	X	X	X	X	X	X		X				X	X				
MULTINATIONAL																										
Trant	X								X							X			X	X						
Boulton					X									X						X						
Yorath/Boulton	X	X	X	X	X	X	X		X	X				X						X						
Whitman	X	X	X	X	X	X	X								X		X		X						X	
NATIONAL PROGRAMS																										
Petkovsek				X									X						X			X				
Withrington/Joseph	X												X						X			X				
Paule				X							X		X						X		X	X				
Chumo					X								X			X						X				
Papendorp	X													X	X				X			X				
von Hofsten	X											X					X		X		X					
Johnston/Tribe							X		X	X						X	X					X	X			
Sheppard			X						X	X									X			X				
Stevenson, et al.							X		X	X								X			X					
Blum						X			X							X	X	X			X					
Parker/Witt					X				X							X	X	X	X		X					
Eulefeld	X									X									X		X					
Krasilchik			X						X								X		X							X

	World Region							Target Audience								Emphases				Sponsoring Group						
	Western Europe	North America	Latin America	Eastern Europe & USSR	Africa	Asia	Australia & Oceania	Formal - pre-school	primary	secondary	tertiary	teacher education	Non-formal - youth groups	general public	specific adult groups	Natural Environment/Nature Study, Ecology	Natural Resources/Conservation Education	Outdoor Education	Human Environment	International Organization	National Government	National Organization	Local Government	Local Organization	Private Institution or Company	University
COMMUNITY PROGRAMS																										
Mares	X								X	X									X			X				
Earnshaw/Skilbeck							X		X					X					X				X	X		
Davis, et al.							X		X							X							X			
Fensham/Jeavons							X							X		X			X				X			
Capurro			X									X					X		X		X					
Hurry					X							X						X	X							X
Dyasi					X										X		X							X		
Allen					X									X			X			X						
SINGLE INSTITUTION																										
Fensham/Jackel							X	X	X	X	X							X					X		X	
West/Hansen	X								X	X				X											X	
Richards					X				X									X							X	
Geerling/Lob	X									X							X	X	X							X
Robottom							X					X							X							X
Emmelin/Soderlund	X										X						X		X							X
Tuntawiroon						X					X								X							X
Pannier/Ruiz			X								X						X		X							X

included under the environmental education umbrella, does not usually reflect any particular attitude toward the environment, but is solely an approach to teaching. Here, the environment serves as the vehicle of education. Outlined by L. B. Sharpe's dictum to teach outdoors that which can be best taught there, and teach indoors that which can be best taught indoors, it is not limited by discipline or subject matter. As such, outdoor education may be a subset of nature study, of conservation education, or of other educational movements, but is not defined or subsumed by any of them.

The human environment, including the human-built and people's socio-economic environment, completes the spectrum of concern of environmental educators. Also included in many of these human environment programs is an attitude toward learning as a self-actualizing experience for the learner. As in Aldrich and Blackburn's (1975) challenge, environmental education deals with the human environment and deals with it in a way that empowers the individual:

> In order to effect this good, environmental education has to offer opportunities to explore the social, psychological, aesthetic and physical worlds that people inhabit, it has to contribute to the development of confidence in the individual's ability to change and to live harmoniously with the environment.

This human orientation was demonstrated by an emphasis on quality of life factors in the proceedings of the Intergovernmental Conference on Environmental Education held in Tbilisi, USSR (Jeske, 1978).

These categories of environmental emphasis (natural environment, natural resources, human environment) and environmental education movement (nature study, conservation education, outdoor education) are not exclusive. Many of the programs in this volume fall into more than one category. The categories are helpful in examining the development of environmental education and are included here to provide the reader with guides to the content and approaches of the cases presented.

Environmental Education as Mandates at Tbilisi

The foregoing discussion and categorization set environmental education in an evolutionary and historical context. Summing the categories and components delineated provides a working definition of environmental education, which is congruent with the definition coming out of the Tbilisi conference. The programs within this volume fit the definition of environmental education as agreed upon by the 66 countries attending the Intergovernmental Conference on Environmental Education in 1977. The goals and components it prescribes reflect the consensus opinion of what environmental education in the world should be, and as such are often reiterated in the case studies in this volume.

Environmental education can be defined in terms of the goals toward which it strives, its components, or the general characteristics of the education programs that represent it. The goal of environmental education as adopted by the Belgrade conference in preparation for Tbilisi was:

> To develop a citizenry that is aware of, and concerned about the total environment, and its associated problems, and which has the knowledge, attitudes, motivations, commitments, and skills to work individually and collectively toward solutions of current problems and prevention of new ones (Unesco, 1975).

Accomplishing this goal will "create new patterns of behavior of individuals, groups and society as a whole toward the environment" (Jeske, 1978).

The approach to categorization at Tbilisi was to organize the components in terms of categories of objectives, including awareness, knowledge, attitudes, skills and participation (Jeske, 1978). The Tbilisi delegation did not delineate the particular components or content of environmental education. A list of components or specific content description of environmental education would be almost as long as a list of environmental education programs. Each program focuses on its own area of concern. A sample list of components was attempted by the United States Environmental Education Act of 1970, as amended, which includes population, pollution, resource allocation and depletion, conservation, transportation, energy, technology, economics, urban and rural planning, and their interrelationships as under the purview of environmental education (Banathy, et al., 1979).

As discussed earlier in defining environmental and educational categories, the general characteristics of environmental education relate to its approach to the environment, education, and associated educational innovation. The general characteristics stressed in Ian Robottom's case study on Deakin University program in Australia are the integrated nature of environmental education, a concern for developing environmental awareness, the problem-solving and activity orientation of environmental education, and a decision-making component. Similar trends are generally reflected in environmental education as practiced today. Three major characteristics in environmental education programs in the world today are: 1) holistic--reflecting an attitude toward the total environment, whatever the environmental emphasis; 2) interdisciplinary--involving many disciplines, rather than being an additional content area in the curriculum; and 3) problem- and issue-focused--dealing with environmental concerns of current interest (Banathy, et al., 1979).

The holistic nature is reflected in the view toward the total environment, including the human elements as outlined in the earlier discussion of the development of environmental education. Underscoring the significance of this holistic outlook, the Tbilisi resolutions include the urban environment and human habitat. Clauses calling for improvement of the "quality of life everywhere" and safeguarding elements of our natural and cultural areas to works of arts, holy places and human settlements, echo this attitude (Jeske, 1978).

The Tbilisi final report particularly stresses the interdisciplinary nature of environmental education. According to the Tbilisi prescription, environmental education should be the "product of contributions from various disciplines and education experiences to knowledge and understanding of the environment and to the solution of its problems and its management" (Unesco, 1981).

The conference called for redefining the role of education when its report stated that:

> ...the point of environmental education is not to bring about minor changes in school patterns of learning but to promote new basic knowledge and new approaches within the framework of an overall educational policy that stresses the social role of educational institutions and the need to create new relationships among all the participants in the educational process (Unesco, 1977).

This is a major challenge to environmental education, working within the already established infrastructure of education, a challenge which can be met by fulfilling the recommendations and promise of the Tbilisi meeting. Developing environmental education programs of a holistic and interdisciplinary nature dealing with the practical problems of the real world represents an opportunity for transforming and regenerating education.

The case studies in this volume are international in that they are environmental education programs from around the world. They are not case studies in global environmental education programs. The programs themselves are not intentionally global in scope, but since we are all inexorably linked, in affecting any environment they will affect the global environment.

The Tbilisi meeting was an intergovernmental conference and the environment is a global environment. This was reflected in another resolution of the conference: "Finally, environmental education should adopt a regional and world outlook and should be forward-looking so as to ensure the permanent and global character of actions undertaken" (Unesco, 1981). All environmental education must be in its essence, global education, as our environment is a global environment. All people and all localities are linked by our common home. As Aldrich and Blackburn (1975) so succinctly state: "One single factor makes environmental education international: necessity!" As the ramifications of local decisions that affect the environment are felt across the continent and the globe, environmental education has become increasingly globally oriented.

An understanding for the plight of the world and a comprehensive understanding of the earth can be brought about through a strategy of linking personal local actions to their positive and negative global implications. Global environmental education activities that do this by bringing world environmental issues to a level that has direct relevance to the individual are described in another ERIC publication, Thinking Globally and Acting Locally: Environmental Education Teaching Activities, by Lori D. Mann and William B. Stapp (in press).

The consensus in Tbilisi charged environmental education with the responsibility of fostering a sense of concern and solidarity between countries and ensuring the preservation and improvement of the total environment. An initial step in bringing about this solidarity is understanding, followed by sharing, and mutual cooperation. The editors hope that this book facilitates this exchange.

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PROLOGUE

This book shares examples of innovative environmental education efforts from around the world. The case studies in this volume furnish a sampling of representative and exemplary programs from various regions of the world and thus provide the reader with a taste for current environmental education worldwide. The cases gathered here are neither an exhaustive nor a comprehensive collection. There are many excellent programs that are not mentioned in this volume. Our intent is that the programs described will provide meaningful information on environmental issues and approaches to education in other cultures, and further, that this information will stimulate environmental educators' interests in the global environment and cooperative environmental education programs on the international level.

The case studies were submitted in response to queries written by the editors. The editors contacted four groups of individuals: 1) those with whose work we were personally familiar; 2) others whose programs we discovered through a search of the international environmental education literature, such as Trends in Environmental Education (Unesco, 1975) and Connect, the United Nations Educational, Scientific and Cultural Organization (Unesco) environmental education newsletter; 3) others who are known as leaders in environmental education in their countries; and finally, 4) those whom the initial contacts or other professionals recommended.

In making the final selection of papers for this book, the authors looked for a diversity of educational approaches, and representation of regions throughout the world. The case studies included were not chosen at random nor do they represent any particular trend in environmental education today.

The opening section of the book provides a philosophical overview of environmental education and strategies to promote environmental education internationally. The following sections are organized around the scale of the environmental education program, ranging from multinational to single institution. The multinational programs are those which involve institutions, organizations, or governments of more than one country. The national programs are single programs intended for use throughout a nation. The community programs occur in one community or localized area of a country, and focus on that community's environment. The single institution programs are undertaken at one school, university or museum. Although dealt with last, these single institution programs are often on the cutting edge of the movement.

The case studies are further categorized by the matrix on pp. ix-x. This matrix is intended to make the book more useful to the reader by arranging the programs by world region, target audience, environmental and educational emphasis, and sponsor For the purpose of this report, the world is divided into seven geographical regions: North America, Latin America, Western Europe, Eastern Europe, Africa, Asia, and Australia and Oceania.

The target audiences listed in the matrix include both academic and nonacademic groups. Education includes a wide range of endeavors from formal education in schools to nonformal education blending with communication and public relations. Environmental education is a life-long process and must reach people from a wide range of ages, educational backgrounds, and professions. The intended audiences of these programs are described as formal audiences (preschool students, primary students secondary students, tertiary students, and teachers) and nonformal audiences (youth groups, general public and specific adult groups such as certain professions or government officials). Many of the case studies reach multiple audience groups.

The sponsoring group is the organization or government which initiated or financed the program presented. Sponsoring groups listed on the matrix are international organizations, national governments and organizations, local governments and organizations, private institutions or companies, and universities.

The environmental and educational emphasis category delineates the cases on the basis of the environment examined, and the environmental education movement reflected. This provides the readers with an encapsulation of the content of the program and the educational strategy.

We share these case studies in the hope that they are applicable to other situations, that the program concepts and ideas presented are transferable from one culture to another. They are presented primarily for a United States audience because of the orientation of ERIC, the publishers. Educators in the United States, through ERIC, national organizations and conferences, journals, and other sources, have access to many examples of environmental education in their own country. There is at the same time a paucity of information on programs in other parts of the world.

In presenting programs from other cultures as models for environmental education endeavors in the United States, we do so with a knowledge of the hazards of transferring education programs from one culture to another. There are many examples of United States education and training programs which have failed in other regions of the world because the people implementing them were not sensitive to the cultural constraints of the recipient nation. Similarly, caution needs to be applied when transferring programs to the United States.

Each of the programs has underlying, but often obtrusive, cultural assumptions, which make it suitable and successful in its own cultural setting, but may spell its doom when applied elsewhere. As Paa-Bekoe Welbeck (1978) pointed out in a paper on training natural systems managers, "Perceptions are culturally directed to influence our structuring process and interpretation. These processes can influence cross-cultural interaction, serving as barriers and hurdles to overcome." In most instances, they can be overcome, but they should not be taken for granted or ignored.

The case studies in this book provide information on the environment and environmental problems and concerns of various countries, insights into that country's attitude toward the environment and education, and models of valuable programs created for that nation's situation. Many of them incorporate international cooperation or a global perspective. Each author's contribution to this volume is an act of international cooperation itself, one the editors hope will inspire further cooperation and exchange.

EDITOR'S NOTE

The use of gender is an individual, sometimes culturally determined, part of every writer's approach to communication. The spelling of certain words also varies between nations and cultures. In addition, authors were required to write their case studies in English, which is in many cases a second language.

For these reasons, the editors have elected not to attempt standardization of the writing styles of the papers in this volume.

PHILOSOPHICAL FOUNDATIONS AND STRATEGIES

In this first section, William Stapp and Leena Aho provide a philosophical and theoretical framework for environmental education and national environmental education strategies. Subsequent papers describe environmental education efforts in a variety of nations and world regions. The Unesco case study delineates environmental problems by those most prevalent in developed countries or those most common in developing countries. The importance of looking at the socio-economic roots of problems and behavioral solutions is underscored and then an historical examination of Unesco's role in promoting environmental education internationally is offered.

Following Stapp's Unesco study, Leena Aho presents a research study that focuses on children's conceptualization of the environment in a belief that the cognitive structures of which the child has a command will guide the child's relationship with and attitude toward the environment. The major tenets of this work stress the developmental preparedness of children to conceptualize about the environment along the lines of the work of Piaget. Her theoretical approach also provides an orientation to what environmental education is.

The papers by Innokenti Laptev and Z. Kostova provide the philosophical approach to environmental education in the USSR and Bulgaria, respectively. Both reports illustrate a strong support for environmental education by the central government and a concern for rational utilization, conservation and improvement of people's environment. Environmental education is implemented as an integrated system of obligatory subjects and various in-school and out-of-school activities. At the primary level, in both the USSR and Bulgaria, love and appreciation of nature and the value of the natural environment is stressed. Upper level training is vocationally or resource-field oriented. In the USSR, students work at forests and on environmental protection patrols; and in Bulgaria, the secondary curriculum has sections dealing with environmental problems and effects on humans.

In China, the state of environmental education, as described by Wang Huen-pu, similarly concentrates for the early years on nature awareness and appreciation, for the intermediate level on ecology, and for the upper level on natural resources. The China paper also describes related environmental education materials and media and programs.

Sophie Jakowska describes a situation in the Dominican Republic where environmental education is integrated into the whole society. Environmental education programs are incorporated in the schools as well as sponsored by such diverse groups as governmental agencies, nature societies, Rotary, Lions and Jaycees. The local newspaper and Catholic monthly publication also contribute to environmental education.

The papers on Singapore, Nepal and Korea set the stage for environmental education by describing the environmental setting of these areas and the problems that have ensued from development and population growth. C. B.

Lim highlights the *National Health Campaign* in Singapore and briefly reports on environmental education for schools, science camps, the general public and an environmental training course. He then briefly describes the primary and secondary programs and efforts of organizations. Don Jun Kim gives a more detailed presentation on an interdisciplinary, cooperative program of environmental education curriculum involving natural science, social science and education specialists in Korea. For the last paper in this section, Karnaya Sakya cites a number of programs in Nepal and provides a more thorough interpretation of the National Committee's effort, especially in the area of reforestation, a paramount concern in Nepal.

The papers in this section work together to provide a comprehensive understanding of what environmental education is and how it is carried out in various world regions. The theoretical groundwork on child development is reflected in the national programs which deal with awareness and appreciation on the lower levels and problems and decision making on the upper levels. The reports also provide United States environmentalists and educators with insights into problems and organizations in other parts of the world.

STATUS AND ANALYSIS OF UNESCO'S EFFORT TO FURTHER ENVIRONMENTAL EDUCATION INTERNATIONALLY--TOWARD A NATIONAL STRATEGY FOR ENVIRONMENTAL EDUCATION

by Dr. William B. Stapp (United States of America)*

Introduction

Environmental problems exist in all countries of the world and at every state of economic development and political ideology. Countries that are in the process of development frequently experience problems of two types, those associated with underdevelopment and those resulting from poorly planned development. Those problems frequently linked to underdevelopment are poor farming techniques that lead to soil erosion and depletion, improper management of forest resources, poor living conditions in regards to health and nutrition, vulnerability to natural disasters, and the lack of educational programs and strategies designed to help resolve these problems. Some other developing countries in an effort to overcome some of the problems noted above have adopted inappropriate measures based upon short-term gains and those not suited to the existing environmental situations. These development strategies have led to the rapid depletion of certain resources, increased pollution and in some instances the spread of diseases.

On the other hand, many developed countries are currently faced with severe environmental problems. Some of the more critical problems faced by developed countries are industrial pollution, overexploitation of resources, and a variety of social and physical problems that confront metropolitan areas.

When programs aimed at development are not planned adequately, the results usually fall into one or more of the following categories: the deterioration of resources, such as the reduction in quantity and quality of mineral resources, or those of the land, forests, or aquatic sites; biological pollution by organisms that cause disease in humans; chemical contamination resulting from effluents, pesticides, products or other materials; and physical pollution such as noise, silting, thermal wastes, or visual blight.

It is important to keep in mind that environmental problems cannot be resolved by considering only technological means. Consideration must also be given to the socio-economic roots of these problems. It is apparent that we will be facing the environmental problems of today in the future, and breeding new ones, until we identify the causes of our environmental crisis and develop certain programs designed to help resolve them.

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It is evident that there can be no hope of finding viable solutions to environmental problems unless and until education, at all levels, is suitably modified to enable people from all walks of life to comprehend the fundamental interaction and interrelationships between humans and their environment.

Within the beliefs and attitudes of our population lie the behavioral roots of such problems as pollution, energy wastage, and the destruction of the environment. There is a general lack of a global ethic encompassing the world environment, an ethic which espouses attitudes and behaviors on the part of individuals and societies which are consonant with humanity's place and critical role in the biosphere.

Unesco became involved in environmental education as a direct result of Recommendation 96 at the United Nations Conference on the Human Environment. This recommendation stated that "organizations of the United Nations system, especially Unesco, should establish an international program in environmental education, interdisciplinary in approach, in-school and out-of-school, encompassing all levels of education and directed toward the general public, in particular the ordinary citizen living in rural and urban areas, youth and adult alike, with a view to educating people as to simple steps one might take to manage and control one's environment." Furthermore, the recommendation called for Unesco to work with all appropriate United Nations agencies, international nongovernmental organizations, and the 148 member nations to develop a framework and direction for furthering environmental education internationally.

Analysis of Unesco's Role in Promoting Environmental Education Internationally

In September of 1974, Unesco's General Conference approved a budget for the environmental education program of $65,000 for a period of two years, posted and recruited a director for the program, and appointed a half-time secretary.

In October of 1974, a consultation meeting was convened by Unesco. Representatives were present from many United Nations agencies, international governmental environmental education organizations, and experts in environmental education from each region of the world The purpose of this meeting was to review existing activities in environmental education throughout the world and to invite suggestions regarding ways to promote environmental education internationally.

This meeting was of critical importance since it enabled organizations that had been individually active in environmental education in the past to come together to contribute to the development of this new program. In essence, the Unesco effort was designed to build upon the past effort of others. This meeting also served to strengthen ties between the various UN agencies and international nongovernmental organizations (NGOs) involved in environmental education. It also initiated a working relationship between Unesco and the United Nations Environment Program (UNEP).

An outcome of this meeting was a Unesco proposal to UNEP for $2 million for a period of three years. The proposal was approved in January, 1975. The resulting Unesoo-UNEP program was designed to: facilitate the coordination, joint planning and pre-planning of activities essential to the development of an international program in environmental education; promote the international exchange of ideas and information pertaining to environmental education; coordinate research to understand better the various phenomena involved in teaching and learning; formulate and assess new methods, materials and programs (both in-school) and out-of-school, youth and adult) in environmental education; train and retrain personnel adequately to staff environmental education programs; and provide advisory services to member nations relating to environmental programs and education.

The strategy of the program consisted of five phases, each of the first four requiring about one year of preparation and execution: The first phase involved the development of a comprehensive bibliography and working documents for an international workshop held in Belgrade, Yugoslavia, the assessment of needs and priorities of Unesco member nations, and the establishment of a network system for environmental education; the second phase consisted of a series of regional workshops to revise the Belgrade recommendations to better meet regional needs, and the funding of 25 pilot environmental education projects; the third phase was the convening of an intergovernmental conference in Tbilisi, USSR, to develop world policies aimed at promoting environmental education; and the fourth phase was designed to help implement the recommendations adopted at the intergovernmental conference, assigning environmental education experts to each of the Unesco regional offices, encourage the development of national environmental education plans, and to build a stronger financial commitment for environmental education within Unesco. The fifth phase was to build the program into the middle and long-range plans of Unesco.

As a result of the UNEP grant, Unesco was able to hire an additional seven full-time consultants and three secretaries to assist in the operation of the environmental education program. Following the Belgrade meeting, a formal world-wide recruitment process was undertaken. Five individuals were eventually employed by Unesco in regular post positions or as full-time consultants.

It should be noted that one of the prime values of the UNEP funding was not only the ability to bring on additional staff members, but to be able to plan for a three-year program rather than the customary two-year period of most Unesco projects.

Some of the major constraints to the promotion of environmental education internationally were the lack of information regarding: what was occurring in environmental education in each region of the world, especially in the developing countries of the world; the names of individuals and organizations active in environmental education; what each nation perceived as its primary needs and priorities in environmental education; and the commitment of each region to the emerging field of environmental education. In addition, there was a need to become more knowledgeable about United Nations policies, procedures and strategies relevant to the development of an international program, funding to develop such a program and an existing network system to promote environmental education internationally.

Therefore, the first year of the program (1975) was designed to help overcome some of these constraints by: laying out of a four-year strategy; preparing a funding proposal for UNEP; surveying the world literature in environmental education; preparing a series of "state of the art" papers in environmental education; undertaking a world-wide needs and priorities assessment in environmental education; arranging for consultant missions to every developing country; starting a network system in environmental education; and preparing for an international meeting in Belgrade.

To prepare the "state of the art" papers, Dr. David Lockard of the University of Maryland was contracted to review and abstract the world environmental education literature on 15 separate topics. These topics treated the following aspects of environmental education: philosophy; early child; elementary and secondary level education; tertiary level education; training of specialists; training of teachers; youth and adult programs; methodologies; learning environments; instructional materials; evaluations; and national, regional, and international programs. The literature was surfaced by sending letters to governments and known environmental educators in every Unesco member nation. This literature was made available to the 15 environmental education experts from around the world who were contracted to prepare 5,000 word papers on 1 of the 15 specific topics noted above. These experts were brought to Paris to formulate an outline and to assist each other in preparing the papers that would serve as working documents at the Belgrade Workshop in October, 1975.

During this same period of time, a 177-item questionnaire was prepared and sent to the appropriate governmental office in every Unesco member nation to identify national needs and priorities within seven areas of environmental education: programs, instructional materials, training of personnel, physical facilities, funding, organizations, and legislation. To respond to the questionnaire, the Ministers of Education were requested to convene experts from their country representing: formal and nonformal environmental education, governmental and nongovernmental organizations, youth and adult programs, various forms of media, educational planning, teaching, environmental groups, and others. These groups were asked to meet with the Minister of Education, or appointee, to respond to the questionnaire. To assist the Ministers of Education and their convened groups to complete the questionnaire, environmental education consultants were trained in each region and were available to meet with the national committees. In total, 85 percent of the nations in the developing regions accepted these consultants and over 86 percent of all Unesco member nations completed the questionnaire.

At the time the consultants were assisting governments with the questionnaire, they were also identifying environmental education

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programs, materials, individuals, organizations, and institutions active in the field of environmental education in each country visited. This material proved invaluable in developing environmental education documentation centers at Unesco headquarters in Paris and in the various Unesco regional offices. The names of the individuals, organizations and institutions thus identified also contributed to the establishment of a computerized world-wide directory of individuals, organizations, and institutions active in environmental education from Unesco. This network presently has over 12,000 names and is available in print form through Unesco.

The above listed material--an international bibliography. the "state of the art" papers, the needs and priorities assessment, some information from the consultant mission reports, and the structure for an international environmental education network system--provided a series of valuable working documents for the Belgrade Workshop, as well as an important base on which to continue to build the Unesco-UNEP program.

The Belgrade Workshop brought together 20 environmental education experts from each of the five Unesco regions to: amend and refine each of the "state of the art" papers, which were subsequently published as a Unesco book in five languages; identify additional resources for the international bibliography on environmental education, which was later published in three languages by the International Bureau of Education; provide a framework for environmental education--goals and objectives, identified audiences, and guiding principles to the movement; formulate recommendations for the promotion of world-wide environmental education; and obtain a commitment from each region of the world to convene a regional environmental education meeting to revise the recommendations of Belgrade to meet regional needs.

The first year of the program provided the substantive foundation in order to build toward an intergovernmental conference on environmental education (which was later convened in Tbilisi, USSR, in 1977) aimed at producing international, regional, and national policies in environmental education. In addition, the first year stimulated a great deal of interest in environmental education in all regions of the world and within Unesco. The latter was important in order to build a stronger financial commitment and support system within Unesco and the UN system.

Following the Belgrade Workshop, some of the major constraints to the successful development of environmental education internationally were the lack of environmental education in most regions of the world. In addition, there was a need to establish a broad range of environmental education projects, recommendations to further environmental education, and a strategy to implement the recommendations.

The second year of the program (1976) was built on the foundation noted above and designed to overcome the identified constraints. According to guidelines drawn up at the Belgrade Workshop, approximately five projects from each of the Unesco regions were selected from numerous proposals submitted from around the world. These projects focused on school programs, mass media, environmental monitoring, curriculum development, functional literacy, research, workshops and training sessions and other meaningful activities.

A year following Belgrade, regional environmental education meetings were held in each of the five Unesco regions: Bogata, Colombia; Brazzaville, Federal Republic of the Congo; Kuwait, Kuwait; Bangkok, Thailand; and Helsinki, Finland. A sub-regional meeting was also held in St. Louis, Missouri. The working documents used at these meetings were largely special reports prepared by the regional planning groups, the recommendations adopted at Belgrade, and the summary reports of the pilot environmental education projects in the region.

The regional meetings served to bring together individuals in each region for an interchange of ideas and information and to review and revise the recommendations of the Belgrade Workshop to meet regional needs. The regional meetings also spawned valuable discussions on mechanisms for linking individuals, organizations, and institutions active in environmental education from throughout each region. Ideas were also exchanged on major problems confronting environmental education, successes and failures of regional environmental education programs, the formulation of regionally-oriented curricula, and the need for specific kinds of materials and programs and the plans for furthering environmental education regionally. Each region produced a report that served to capture the dialogue and recommendations of each meeting.

Following Belgrade, the first issue of Connect, an international newsletter produced quarterly and distributed to over 12,000 individuals and organizations that help to form the international environmental education network, was published. Connect, published in five languages, serves to communicate with individuals, organizations and institutions in each region of the world regarding international and national environmental education activities, recent publications, important meetings, and other points of interest. It has served as the vehicle for linking people and programs from throughout the world.

Following the regional meetings, a major constraint to the international environmental education program as originally designed was the acceptance of Unesco-UNEP and member nations to the holding of an intergovernmental conference on environmental education to establish international, regional, and national recommendations to further environmental education. The reluctance of some Unesco officials for holding of such a meeting was for two reasons. The first was whether environmental education had matured to the level of establishing sound international environmental education policies and secondly, whether developing countries would be committed to the time and expenses necessary to prepare and send delegations to the conference. After much deliberation, Unesco, UNEP and member nations agreed to such a meeting.

The third year of the project (1977) was primarily devoted to the preparation of the Intergovernmental Conference on Environmental Education, to evaluate the pilot projects, to continue the distribution of Connect, and to develop more fully the environmental education network system.

The Intergovernmental Conference on Environmental Education was held in Tbilisi, USSR on 14-16 October, 1977. It attracted official delegations from approximately 70 countries, eight organizations, and of the United Nations System; three other intergovernmental organizations; and 20 international nongovernmental organizations. There were over 265 delegates and an additional 65 representatives and observers in all.

Carefully prepared working documents were developed by Unesco and distributed to each delegation three months in advance of the conference. In addition, most delegations arrived at the conference with documents regarding environmental education activities in which their nation was currently engaged. As a result of ten full days of presentations and dialogue, various resolutions to promote environmental education at the global, regional, or national levels were discussed. Eventually 41 recommendations were adopted by the conference.

One of the most important of the recommendations was the endorsement of world-wide environmental education goals, objectives, guiding principles and target outcomes, and specific recommendations to promote environmental education.

Some other major recommendations of the conference addressed the following themes: the role and general scheme of environmental education; consumption behavior and the wasteful use of consumer goods; pre-service teacher education; inservice training of teachers; initial education of professionals; vocational training; teaching aids and materials; research and evaluation; dissemination of information; environmental education at colleges and universities; improving the existing intrastructures for information and exchange; social, economic, cultural and psychological factors relevant for environmental education; cooperation with nongovernmental organizations; as well as specific regional concerns.

Specific recommendations within each of the above categories were targeted to the attention of Unesco member nations, international organizations, nongovernmental organizations, or some other appropriate group. Consideration was also given to strategies for implementation of the recommendations.

There was a strong commitment by both Unesco and UNEP in their concluding remarks at the conference to build environmental education into their middle range and long-term plans for education and to assist member states in implementing the 41 major recommendations adopted at the conference.

It is interesting to note that there was a remarkable amount of agreement in the conference at both the conceptual and strategy levels between the developing and developed countries, and the Eastern and Western European countries.

The conference ended with the adoption of a strong conference report and the commitment from each delegation to work with its government in implementing the recommendations.

The fourth and fifth years (1978-79) of the project were directed at implementing the international, regional, and national recommendations approved at the Intergovernmental Conference on Environmental Education. Since recommendations were grouped according to international, regional or national levels and each recommendation identified as to whom it should be sent for implementation, Unesco worked with UN agencies, international, intergovernmental and nongovernmental organizations, regional organizations and national governments to assist in the implementation of each recommendation.

Many regions held regional meetings dedicated to the implementation of the Tbilisi recommendations. In addition, many nations convened meetings for a similar purpose.

In the United States, a "National Leadership Conference" was organized by the Alliance for Environmental Education. The major purposes of this conference were to review recommendations of past national and international environmental educational conferences, assess the present situation of environmental education in the United States in light of the recommendations approved at the Intergovernmental Conference on Environmental Education, and develop a clear set of recommendations to further environmental education in the United States. Furthermore, every recommendation approved at this meeting was targeted (to whom each recommendation should be addressed for implementation); major constraints identified to the implementation of each recommendation; special strategies designed to overcome each constraint; responsibilities assigned for the implementation of each recommendation; a timeline identified; and a procedure established for monitoring each recommendation.

In 1979, Unesco produced a working document on "Suggestions for Developing a National Strategy for Environmental Education--A Planning and Management Process." A summary of guidelines for designing a national process for environmental education is presented in Figure 1.

Another major happening since the Intergovernmental Conference on Environmental Education was the start of a process to decentralize Unesco leadership in environmental education. There has been an Environmental Education Specialist added to each of the Unesco regional offices in Latin America Africa, the Middle East, and Asia. The responsibilities of these specialists vary, but in general they serve to promote environmental education activities within the region by integrating environmental education into all appropriate activities sponsored by the regional office, to assist nations in developing national environmental education plans, and to foster environmental education programs in all other appropriate ways.

The fifth through the seventh years (1980-1982) saw UNESCO build environmental education into its middle-range plan as an integral component, increased the Paris headquarters staff from one post position to three, and increased the Unesco budget for environmental education.

Unesco-UNEP Environmental Education Program

October 1974		October 1975		October 1976		October 1977		October 1979
Phase I Programme objectives	Initial programme activities		Phase II Post-Belgrade activities		Phase III Post-regional seminar activities		Phase IV Future	
Co-ordinate planning			• Network linkages of needs and services • Publications • Newsletter		• Expansion of network system • Publications • Newsletter		• Expansion of network system • Publications • Newsletter	
Implement exchange of ideas and information Provide advisory services Provide, promote and co-ordinate research	• Creation of network system and newsletter • Trend papers and literature • Needs and priorities assessment • Consultant missions	Belgrade Workshop	• Recommendations • Continuing research • Selection and support of pilot projects • Selected missions and reports	Regional Seminars	• Revised recommendations • Continuing research • Evaulation and support of pilot projects • Selected missions and reports	Intergovernmental Conference	• Implementation of recommended policies of the world conference • Continuing research • Evaluation and support of projects • Selected missions • Regional Staff members	National Planning
Support instructional programmes and education of personnel			• Evaluation of Unesco-UNEP programme		• Evaluation of Unesco-UNEP programme		• Evaluation of Unesco-UNEP programme	

Figure 1

The United Nations Environment Program also established an environmental education post position to help coordinate environmental education and to provide greater leadership. UNEP also continues to contribute funds to the Unesco Environmental Education Program.

At the General Conference of Unesco in 1980, the delegates approved a work plan aimed at helping member nations in their efforts to incorporate environmental education into formal and nonformal education for the public in general, with a view to providing a better understanding of environmental problems and teaching people to behave and act in a way which favors the preservation and improvement of the environment. More specifically, priorities during 1980-1982 were aimed at the formulation and implementation of policies for the development of environmental education, the training of personnel, research on interdisciplinary approaches to environmental education, support to innovative activities for the development of teaching and learning methods and materials, including the utilization of mass media, and establishment of national and regional mechanisms for concerted action for the development of environmental education.

Although steady progress is being made in environmental education internationally, some major challenges still lie ahead. Greater effort needs to be made to help coordinate and to assist agencies in the United Nations system and other international organizations to continue to identify ways to promote environmental education. It must also be kept in mind that very little action may occur in environmental education unless national plans are developed to facilitate the establishment and operation of environmental education programs and activities.

At the 1972 United Nations Conference on the Human Environment, in Stockholm, the concern for environmental education was clearly formulated. Since Recommendation 96 of this conference called for the establishment of "an international program in environmental education," it has become increasingly evident that there can be no hope of finding viable solutions to environmental problems unless and until education at all levels is also suitably modified to enable people from all walks of life to comprehend from childhood the fundamental interactions and interrelationships between humans and their environment.

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THE DEVELOPMENT OF A CHILD AND THE PROCESS OF LEARNING AS A BASIS FOR ENVIRONMENTAL EDUCATION

by Dr. Leena Aho (Finland)*

INTRODUCTION

In Finland, environmental education is not a separate subject at school but is taught in connection with a variety of subjects. Originally it was the instruction in natural sciences, primarily in biology, that provided environmental education; while in the first years at school, it was provided through the teaching in local geography. The purpose was to socialize the children with the biophysical environment, society and culture. In Finland as elsewhere, it was emphasized in the last decade that the aspect of environmental education should be incorporated more extensively into the curriculum. The need for research to develop the contents and the methods of environmental education emerged concurrently.

Education sets aims for the development of the child in various areas: the cognitive, the psychomotor and the socio-emotional areas. In environmental education it is impossible to separate these areas. The education should give the pupil information about man's dependency on nature, about the utilization of natural resources and about the consequences ensuing therefrom. But at the same time the pupil should be guided into an appreciation of life in its various manifestations. The object of the teaching is that the pupil should receive information and skills as well as values and attitudes that will enable the pupil to implement the protection of the environment for his own part. In their main outlines the objectives of environmental education accord with what was said in the documents of the Unesco conference held in Tbilisi (Unesco, 1980). Ultimately the education endeavour to guide the pupil into intelligent action and decision making vis-a-vis the environment and its utilization.

Man's relationship with nature, on the other hand, determines the behaviour towards the environment. For the development of environmental education, information will be needed about such things as what this relationship in the pupil is like, and what emphasis it gives to the aspects of information on the one hand, and values on the other. The successful implementation of environmental education also requires analysis of the question of how the pupil is able to adopt, in accordance with his level of development and while promoting this level, desirable forms of behaviour, and how environmental education for its own part may promote the growth of the pupil into a responsible adult.

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The following article is a synthesis of the studies I have conducted on the relationship of the child to nature, and, on the other hand, for the development of education about nature at the elementary school level. By nature I mean the biophysical environment on which man is dependent and in which he is concurrently a factor of great influence. Thus, instruction looking towards the environment cannot be detached so as to form a department of its own among the gamut of sciences, as it consists of an interdisciplinary approach to the environment and articulates with the rest of education, receiving support therefrom and providing stimuli and ideas thereto (Aho, 1979, 1980; Aho and Holopainen, 1982).

Taking Account of the Development of the Child in Improving Environment Education

The chances a child will understand the relations between man and nature are connected with his development, a factor that must be given consideration when environmental education is being developed. Here, use has often been made of the frame of reference proposed by Piaget (Piaget and Inhelder, 1967), according to which the development of the child occurs in stages in a given order. As children in Finland begin school at the age of seven, they are seen as being in their concrete-operational stage or as about to enter it from the preoperational stage. Typical of the thinking of the child at that time is that it is tied to the concrete course of life, to his own experience and beliefs.

It is the level of development of the child that determines what environmental questions it is worthwhile dealing with at the various class levels. Even before entering school, the child has begun to construct an image of his environment and has started to interpret and explain the phenomena in it in a fashion of his own. Since knowledge of the child's thinking and of the structures of the information adopted by the child is a necessary basis for the development of environmental education, information was gathered through conversations with children aged 5-9 about their mental world, and about their ideas concerning nature and man's relationship therewith (Aho and Holopainen, 1982). At the same time it was possible to study the level of the child's thinking processes on the basis of the interpretations and explanations that the child happened to give.

Conversation with the children was so structured that it provided an opportunity to sound out the child's thinking in the learning hierarchy proposed by Gagné (1970). The child's knowledge of the environment was analyzed in accordance with the level of learning on which she moved, i.e., association learning, discrimination learning, concept learning, rule learning or problem-solving learning. It was also possible to discover what general concepts the child first learns before being able to break them down into lesser components (Aho, 1979; Novak, 1977).

The child remembers facts about his environment, he forms concepts of a greater coverage than the individual object and he makes up rules from the concepts. Rules express a more general principle which is useful in solving problems. These various thinking processes have a content. In environmental education the contents originate from various disciplines that involve the environment and man's relationship with it. In improving the environmental education it may consequently be asked what is the essential vocabulary that the child should learn at various ages. It may also be asked what are the concepts and rules of which a command is necessary to enable the child to orient himself into his environment, solve his problems and act intelligently in that environment.

The main object in the development of education about nature (Aho, 1980) became first to find out how it might be possible to define in education a structure and content corresponding to the development of the child and also taking into account the structures of the disciplines. Second, it was necessary to work out expedient methods of instruction based on an analysis of the child's way of acquiring information and processing it.

What is the cognitive basis of environmental education?

It has been pointed out in many contexts that the cognitive basis of environmental education lies in ecology (e.g., Tanner, 1974; Unesco, 1977; Trotman, 1978; Bakshi and Naveh, 1980) and its concepts, in how well the person is aware of the structures and functions of nature and of the effects of man thereon. But in making decisions about the state of the environment and the exploitation of it in the human economy, it also becomes necessary to consider economic and social factors affecting the life and livelihood of people as well as their enjoyment.

In defining what is the cognitive chief object, i.e., message of environmental education, the following notion was arrived at: as the earth produces the nutritional and other conditions for life for man as well as other species, man must act so as to ensure that the earth will be able to provide these circumstances of life now and in the future (Aho, 1980). This adult notion is actually the equivalent of what a child of 5-9 will say when asked what an animal or a human being--including the child itself--will need in order to be able to live. The first factor that children will mention is food (Aho and Holopainen, 1982).

A cognitive basis for environmental education is provided in the low school classes by the material of instruction, which is also necessary in the instruction providing an orienteering with nature. In my study (Aho, 1980) the material was organized by content into entities dealing with the diversity of the environment, the features and conditions of life, and the dependencies and interdependencies of the organism and the environment including man and the environment. The pupils were also introduced to events and phenomena that are within the reach of the pupil and that are yet world-spanning. In all the scrutiny, man was taken into account as a member of the realm of life, as a functioning and influential part of the global ecosystem.

Smaller sequences were formed from the described thematic entities, and these helped the child to analyze the subject. In every sequence, even in the lesson derived from it, there was a separate problem to which an answer was sought through the teaching. Although every extensive theme was dealt with during the very first year at school, the teaching nevertheless emphasized subjects dealing with heterogeneity, and the features and conditions of life,and as the matters being dealt with become more complicated, then the relations between organism and environment, ecosystems or world-encompassing phenomena are examined on the basis of ecology.

On the child's skill at recognizing objects in the environment and at explaining phenomena

Even before school age, the child has developed the ability to discriminate the sensible characteristics of objects and events (Gagné, 1970). This ability is developed to the extent that even in the first school class the child is able to distinguish by appearance even small live insects with the precision adequate for school. He knows the names for the animals and plants which are in the child's social community. The child is familiar with such animals as the fly, the ant and the ladybird, and with birds close to the home such as the great tit and the bullfinch (Aho, 1979; Aho and Holopainen , 1982).

Learning about the environment is dependent in the child prior to school age upon adult guidance. Although the child's own spontaneous activities and observations made on his own initiative are important, the child must learn the language in interaction with other people. By means of language the child can express himself, and it is through language that the child usually shows that a thing is familiar to him. Conversation with the child will tend to systematize the child's image of nature and raise the level of the thinking processes (Aho, 1979).

The cognitive structures, i.e., schemata, of which the child has a command will guide the activities by which the environment is observed (Neisser, 1976). The possibilities of the child receiving new information from the environment are connected to a great extent with what the child has previously learned. As instruction orienting towards the environment provides the child with opportunities of acting among genuine objects and materials of the environment, watching, listening, feeling, smelling and even tasting them; it also promotes the child's skills at observing and experiencing environmental phenomena through the medium of the various modes of perception. In this way the concepts are enriched and the words associated with environmental objects become vivid.

The biophysical environment is a concrete object belonging to the sphere of the experience and life of the child. The child can learn concepts about it by classifying genuine samples, living and lifeless objects in nature equally, or human accomplishments. But it is only the justifications for the classification that tell the teacher what and how the child really thinks and concludes. The grounds for the classification and formation of concepts vary with the level of development and sphere of experience of the child (Aho, 1979; Aho and Holopainen, 1982).

When the child must justify his proposition -- even an answer that seems correct--it may transpire that the child has only an intuitive concept of the fact, or that his reasons are quite different from what an adult would expect. A child may put forward an idea that may seem a highly advanced one but, when the case is analyzed further, it may be seen that the child has learned the fact by rote without really understanding. A child under school age, for instance, is ignorant of what objects in his environment are man-made and what are nature's own. The intuitive concept of the child emerged with particular clarity when the children were to decide what objects in their environment were living or had sometime been alive (Aho, 1979). To be living is not revealed by the appearance, and other kinds of information that the child does not yet have may be necessary.

Concept learning is a condition for a deeper understanding of rules. Children can learn rules by heart or they may draw conclusions about everyday life on the basis of their own observation. The conclusions may be perfectly consistent, although not "scientifically" relevant; these are learned at school. A child knows, for instance, that a cloud consists of water and that rain falls from clouds. But the same child may explain the cloud as being generated from the smoke of a factory; a similar phenomenon that the child has seen.

The child's skill at explaining things and events is connected with the child's general cognitive level of development. At the early stage of concrete operations the child is not yet able to deal concurrently with several different factors. The child's sphere of experience, too, is small. With these factors there may be connecting the fact, for instance, that at the elementary school level all children are not yet able to answer the question whether an object is alive or not. In studying this fact, Piaget (1929) came to the conclusion that children initially regard all functioning objects as living, and afterwards those that move. After passing through this phase, children interpret as living only those that move of their own accord, and it is only at the end of the stage of concrete operations that children are able to recognize that only plants and animals are living.

It seems that most of the pupils in the lower classes think today that only plants and animals, including human beings, are living. Characteristic of living things is that they move and grow. A knowledge of these two features is not yet enough to decide the question of living or not living for many things other than live objects move and grow (Aho and Holopainen, 1982). To settle matters such as these, several factors must be simultaneously taken into account, and in development the pupil is not yet ready for this. This factor also places limitations on the sort of environmental problems that can be analyzed and solved with children at elementary school.

Problem-solving Learning and Environmental Education

In his functional relationship with nature, man constantly has to make decisions and choices. These, again, are not only connected with information, for values too are of importance in decision making (e.g., Botkin et al., 1978), as are skills in solving problems or considering the options and anticipating the consequences of a decision. Problemcentricity is, in fact, one of the didactic approaches to environmental education.

It has been regarded as important that in learning to know how to solve problems, advantage should be taken of problems observed and sensed by the pupil (e.g., Botkin, et al., 1978). The pupil's own environment offers an overabundance of such problems from the first year at school onwards. The pupils can be guided to an understanding of many of the problems by making experiments in order to solve such problems as the generation of rain or of the rainbow, the growth of plants and animals, and combustion and the production of heat.

Some problems, again, are of such a kind that the pupil learns to understand and explain by making observations of his environment and thus assembling facts that are necessary for the solving of the problem. As examples mention can be made, say, of the question of how wastes disintegrate and how man has embellished or defaced his environment (Aho, 1979, 1980).

In everyday situations the child has already learned how to solve environmental problems touching upon himself, on the basis of ready-made instructions provided by adults: the child will not pick berries by a lively roadside or mushrooms from lawns downtown. He has also learned the sort of place to which he may go for a swim. The child can explain his intelligent behaviour by means of information about pollution and dirt. The child has heard about these from adults but without having any in-depth background information about the facts (Aho, 1979).

In analyzing the explanations given by pupils of problems such as those described, it can be seen that the ability to solve problems is connected with the child's general knowledge of nature. The knowledge of nature, again, can be inferred as reflecting the cognitive development of the pupil. The Rasch model, a latent trait theory model, was applied to an analysis of the answers of pupils to the questions: "Which of these will break down sooner by itself?" and "Which of these is the best place for a swim?". The item characteristic curve is the function relating the probability of correct response to an item with hypothetical latent trait scale, in this instance information about nature. The item characteristic curve shows the probability of the right answer on the conditions that the persons possess a certain amount of information about nature, and on a certain easiness of the item.

In the examples the chances that the pupil will solve the problem will increase with the amount of information about nature: the empirical curve follows the item characteristic curve. It is seen from their progress that the solution of problems of this sort poses considerable difficulty to school entrants and even to children who have attended school for a year. But after the first two years of school, the probability of solving the problem exceeds the probability .50 (Aho, 1979). The item analysis supports the impression that environmental problems of this sort can be dealt with as early as the elementary school level, if the pupil has the necessary background information and abilities.

Environmental Education as a Part of Education at School

The cognitive and emotional developments of the child are interconnected and cannot be dealt with separately in environmental education either. At the same time as knowledge is accumulated, it becomes possible to learn to understand more profoundly the value of life, to feel compassion and admiration for the environment, or to appreciate beauty both in the constructed and in the natural environment.

The realization of the objectives of environmental education becomes apparent in the conduct and attitudes of the human being towards the environment. life people and the world as a whole. Growth towards these attitudes begins from the first years of life. Education becomes intentional when school begins, at the latest. The achievement of a favourable result requires of education a knowledge of the forms of instruction and the contents corresponding to the development of the child. Obtaining information about these is the subject of research.

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ENVIRONMENTAL EDUCATION IN THE SCHOOLS IN THE PEOPLE'S REPUBLIC OF BULGARIA

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INTRODUCTION

Problems relevant to the optimization of the society-nature relationships draw the attention of the public all over the world. Reasonably, Comrade Todor Zhivkov, First Secretary of the Central Committee of the Bulgarian Communist Party and Chairman of the State Council of the People's Republic of Bulgaria, says: "The harmonious relationship between society and nature is a task of the whole mankind" (1980). The solution of these problems requires a new way of thinking and a new approach to the economic and political development of society characterized by greater responsibility and competency with regard to their ecological consequences. Under these very circumstances of today, when society influences nature more and more deeply, education has unusual significance. This is why environmental education development all over the world, as well as the international cooperation expansion in the protection of the unique nature of our planet, are some of the principal tasks of many international organizations such as Unesco, in cooperation with UNEP, IUCN, COMECON and others having a considerable success in this direction.

The primary position among the international activities is given to the First Intergovernmental Conference on Environmental Education, held in Tbilisi, USSR, in October, 1977. In the conference recommendations, a world-wide scientific strategy for solution of the pedagogic aspects of environmental protection is built up and aims at elaboration and further improvement of educational plans and curricula.

In our country good conditions exist to bring the whole population to an attentive and conscious attitude to the environment. The Bulgarian Communist Party has worked out a clear and consistent policy for environment conservation and improvement. It was underlain in the new basic law--the Constitution of the People's Republic of Bulgaria, adopted by the National Assembly in 1971. A very good nature-protection legislation was established and a system of central and local environment-protection bodies was built.

The realization of the state ecological policy depends more and more on education, culture, the level of consciousness and the sense of social responsibility of every person. The upbringing of such individuals begins from a very early age at home, in kindergartens, at school and continues throughout their whole life. In this field, special claims are laid to school, through which the whole young generation of our country passes.

The introduction of new plans and curricula began in our primary and secondary schools on the basis of the resolutions, adopted by the 1969

Ministry of Education, Scientific and Research Institute of Education, Sofia, Bulgaria.

Plenary Session of the Central Committee of the Bulgarian Communist Party on Education. They create favourable conditions for laying the foundations of environmental education. The education reform was carried out using the most modern and advanced concepts of the aims and tasks with regard to the fundamental sciences at school, having in mind the state and development of these sciences in world today and at the same time the peculiarities of the social and economic development of Bulgaria. Ecologization of education was carried out on an interdisciplinary basis while working out the new educational plans and curricula.

AIMS OF ENVIRONMENTAL EDUCATION

Environmental education is in close connection with the ideal of a harmoniously developed personality. Ecological culture is a part of general culture and it is acquired throughout the whole individual development. "A man, possessing such kind of culture, submits his entire activity to the requirements of a rational use of nature, takes care of environmental improvement, does not allow its destruction and pollution. This concerns all kinds of labour as well as recreation" (Ministry of Education, 1979a). This is why environmental education, through the process of which such kind of culture is acquired, is an integral part of the entire conscious and systematically planned activity with regard to nature and natural resources. It aims at including the whole population into it.

The aims of environmental education are determined according to the national policy in this sphere. The main goal of the state and the ecological party policy is the following: "Protection and improvement of the qualities of natural environment as a basic source of resources and living environment of today and future generations, more complete harmonization of the society-nature relationships." The main aim covers the following subaims: a) nature protection; b) nature restoration; c) nature transformation; d) nature education. The content of the nature-education aim includes formation of communist attitude in the population and young generations towards environment as a factor of social and economic development and as an inexhaustible source of patriotic, aesthetic and physical education (Anonymous, 1975).

Communist attitude to environment means a complex set of attitudes, in which knowledge, emotions, convictions and motives interact most closely. The main elements of this complex set are the moral, intellectual, aesthetic and active practical attitude to environment.

Moral attitude is based on high consciousness of the significance of nature and natural resources for life and for the development of society. It is expressed in a careful and responsible attitude towards natural resources, critical attitude to one's own and other people's activity that has direct or indirect impact on the ecological balance. A proof of moral attitude toward the environment is the possession of an active life position in students: struggle with the indifferences to natural resources destruction, irreconcilability to the exploitation and destruction of natural territorial areas, clear consciousness of one's own place in the national and global activity in nature protection, humane feelings for living creatures.

Intellectual attitude to environment is based on a system of scientific knowledge and views of the mutual man-society-nature relationships. It covers knowledge for the biophysical, social and cultural evolution of mankind, as well as knowledge for the factors that determine them and for the future trends. A substantial component of the system of ecological knowledge is the knowledge about local, national and international activities for nature conservation and reproduction. The intellectual attitude towards environment is revealed in the desire to acquire ecological knowledge and in the scientific approach to the solution of ecological problems.

Aesthetic attitude is an original reflection of nature. It is revealed on every level of nature perception. The aesthetic needs are its main indicator. They are characterized as an aspiration for beauty and activity according to the laws of beauty. The aesthetic attitude towards nature is expressed in perception, experience and understanding of beauty and harmony in it. It is connected with the aesthetic needs of interaction with nature not only for passive contemplation but as well as for activity for its constant renovation and development.

Moral, intellectual and aesthetic attitudes towards nature are revealed in the practical activity of pupils. Only in the process of acting can skills of nature protection be built up. The work of nature protection, done by the pupils, gives them the opportunity to enjoy satisfaction of the public benefit. Such kind of activity helps them to realize the acquired knowledge and to see their practical importance.

In the process of education a harmoniously developed personality is formed that understands the dependence of human beings and society on environment, that realizes the necessity of its protection and improvement, that takes an active part in the work done in this direction that is capable of appreciating its beauty, that possesses a sense of social responsibility.

PRINCIPLES OF ENVIRONMENTAL EDUCATION

In our country, the main principles of materialist dialectics are taken as methodological basis for the creation of a complete system of knowledge, abilities and habits of nature protection and building up an adequate attitude to environment. In the first place we put the principle of total acquaintance with environment on the basis of complex explanation of all links and interrelations. This principle reflects the conception of the materialistic dialectics of the complex links and interrelations in the "man-society-nature" system. Man must be considered as an inseparable and integral part of nature. It follows from this that practical activity of society can be performed without destroying the ecological balance only on the basis of profound knowledge of natural laws.

Nature is changed more profoundly in the process of labour activity of society during which exchange of substances between them is performed. The transforming labour activity is either creative or destructive. The second principle follows from this. This is *the principle of valuation of nature significance as a material basis for harmonious development of society*.

The man-nature relationships are revealed under given social conditions, on a given stage of development of society and the means of production. They are determined historically, politically, technologically, etc. It follows from this that when ecological culture and consciousness is brought up in pupils, *the principle of dependence of attitude to nature on different social and political conditions must be taken into consideration*.

Besides knowledge is the process of teaching pupils to acquire skills and habits of responsible behaviour in nature and active participation in its cultivation. This is why in the selection of the content, *the principle of unity of theory and practice* in environmental education is taken also into consideration. During the educative process this principle is carried out through optimum ratio between theoretical and practical activity of pupils in nature protection. The practical activity in its character is concretely productive and socially useful.

An overall picture of the real world is created in the mind of pupils through a complex system of sciences, each of which develops in close connection with the others. Links between sciences reflect the real links between objects and phenomena in the surrounding world. The deeper we go into a given phenomenon, the closer is the interaction between different sciences and various interscientific relations are carried out. They. on their part, require consideration of *the principle of interdisciplinary relations* in environmental education.

The realization of the aims of environmental education is a complex and continuous process that must begin at a very early age. At every level of teaching, it must be enlarged and deepened so that pupils may acquire a system of knowledge and skills that will be transformed into sound convictions. This requires environmental education to be *systematic and constant*.

LEVELS OF ENVIRONMENTAL EDUCATION IN SCHOOLS

In our country, environmental education is built up on the basis of the above-mentioned aims and principles. It is characterized by three levels:

First Level: including the knowledge about environment into integrated subjects treating natural and social phenomena in their interaction; I-III grades of secondary school.

Second Level: differentiated teaching the environmental knowledge according to the specific character of the different subjects on the basis of the interdisciplinary links.

Third Level: integrating the knowledge of environment protection in an integrated system and building up a scientific picture of the world through a generalizing course "Man and Environment."

Environmental education is performed by means of an integrated system of obligatory subjects and various in-school and out-of-school activities.

Environmental Education in Primary School

The building of a system of concepts and the upbringing of a responsible attitude towards nature is performed by the interaction of three factors: emotional, intellectual and active practical. At primary school the influence of the emotional factor is leading. Love for nature and admiration for its beauty and humane feelings for the living creatures are brought up in the pupils.

In the I-III school grades the subject "Homeland Study" is taught. It integrates the knowledge about the natural and social environment of the native place with which pupils contact directly. The content is integrated around some basic ideas which could be formulated most generally in the following way: season changes in nature; variety of the flora and fauna; mutual relation between living and nonliving nature; and man-nature interrelationship.

Revealing of the basic ideas is connected with the upbuilding of concrete notions and acquisition of elementary concepts of nature. Gradually these concepts are enlarged and enriched.

When seasons are studied, special attention is paid to the labour activity of people in nature. On one hand, the significance of nature as a source of foodstuffs and raw materials for man is revealed, and on the other--the necessity of natural resources protection for man's own use. Pupils understand the relation between the care for plants and animals and the quantity of the produce. The significance of nature for improving man's health is explained. In addition to the material benefit of nature, the pupils' attention is called to the beauty of their local town or village, the beauty of the vicinity during the different seasons. This fills pupils with pride and gives them joy. They feel that because of its beauty nature must be loved and protected.

Pupils acquire knowledge for the transforming activity of man and nature; its role in creating new and more productive varieties of plants and breeds of animals is also explained. Besides the positive consequences of the farming activity of man, some negative consequences that upset the entity and beauty of nature are pointed out. The damages inflicted by man on nature when clearing the forests, polluting waters and air, destroying habitats and species, are explained.

The content of "Homeland Study" involves the topic "Nature Protection" by means of which new concepts of aesthetic influence of environment on man for soil protection, creation of national parks and reserves, for water purification, for planting rivers with fish, for new plantations, artificial water-storage reservoirs. air purification and other aspects are shown. Pupils arrive at a conclusion that existence of human beings is unthinkable without nature and that is why they have to protect and improve it.

Great opportunities for building up an aesthetic attitude to nature are offered by the Bulgarian language and reading course in the primary school. With regard to the season phenomena the syllabus involves topics that contribute to building up patriotic feelings, caused by the artistic representation of natural beauty. The stories about animals and plants that suggest definite moral principles in children in emotional and aesthetic ways are of interest to youth.

The course of drawing and art covers topics that give the pupils opportunity to feel the beauty of their native place and the creative spirit in socialist society. When visiting museums, art galleries, art and culture monuments, the young generations get acquainted not only with the works of art but they acquire habits to protect and conserve them for the next generations.

Labour teaching has a very important significance for upbringing of an active practical attitude to environment. Pupils are taught and brought up in careful attitude to raw materials, natural resources conservation and hygiene of the place of work. During these lessons, habits for production activity, closely connected with the use of natural resources and environmental protection, are built up.

In order to acquaint pupils with nature, varied school labour and play activities are organized, such as solution of problems, modeling, making of objects out of natural materials, making artificial birds' nests, caring for plants in greenhouses and for animals in the little school zoo during the different seasons.

The knowledge and skills, acquired in the primary school, are developed and elaborated in the next grades.

Environmental Education in IV-X School Grades

The content of the separate subjects in IV-X school grades covers the following basic ecological ideas: protection of nature from destruction; rational use of natural resources; protection of nature spots. natural territorial areas; monuments of history and civilization, museum reserves and so on; and local, national and international measures for protection of natural resources.

Each subject, according to its specific character. affords an opportunity for these ecological ideas to be explained from different points of view. The subject "Natural History" in IV degree involves the sections "Our Planet--the Earth," "Atmosphere," "Hydrosphere," "Littosphere," "Biosphere." Here the system of scientific knowledge is closely connected with knowledge of conservation of nature and natural resources.

Biology teaching in V-VI grades is dedicated to two basic ideas--mutual relationship and dependence of plants on their environment and measures protection of plant variety. In VI and VII grades the basic objective laws in the structure and functions of animals and their adaptation to the environment are revealed. The entire content brings up interest and love for the animal world. In the section "Principles of Ecosystems," ecological concepts are built up which refer to the mutual relationships between the abiotic and biotic factors in the ecosystems

In VIII grade problems connected with mankind as an integral part of nature are discussed. Special attention is paid to the optimum ecological conditions of life activity of man and the means of their realization. In IX-X grades theories of origin of life and man, evolution of organisms and problems of genetics are treated. They consist of the necessity of environmental conservation. In this grade a section called "Fundamentals of Ecology" is included. The cycle of matter and energy transformation--basic processes in the biosphere--are taught, as well as the interrelations among populations of biocenoses. Besides the explanation of structure and the functions of living systems, the content emphasizes the peculiarities of the environment that provide their existence.

In the chemistry teaching, VI-X grades, the following nature conservation aspects are revealed: noxious influence of chemical elements and their compounds on the organisms, the use of chemicals in the national economy, the chemical industry and nature protection, purification of the industrial waste gases and waters. The significance of technologies without or with little wastes of the closed cycles of production, of the recycling of water, of automation and distance production control is explained.

The content of physics, VI-X grades, gives knowledge about the physical factors of nature pollution: mechanic, thermal, noise, radioactive. harmful influence of ultraviolet beams. At the same time pupils acquire knowledge about the physical methods of solving pollution problems.

Geography reveals the regularities that control the relationships among separate ecosystems on a global scale, the possibilities of rational use of natural resources and their significance in the economy in various countries. Nature protection knowledge is organized on the following basic ideas: laws of development in nature, objective laws of social development, links between the social processes and nature. kinds of nature conservation activities.

The nature-conservation content in teaching history. V-X grades, is revealed mainly by means of explanation of the changes that take place in man's attitude towards nature in the process of historical development, by means of pointing out the significance of material conditions for economic activities of countries during the different economic and social formations and in the process of acquaintance with the wealth of material culture of different civilizations, created through the centuries.

The literature curriculum includes works in which nature is the main object of representation or an element of the composition. They contribute to the upbringing of an aesthetic attitude towards nature.

In the subjects of the aesthetic cycle, nature is discussed in the following aspects: artistic representation in art, a source of inspiration for creating works of art, means of artistic representation of nature.

The knowledge and skills in different subjects are expanded and enlarged by a system of out-of-school and out-of-class forms of work: courses, excursions expeditions, associations and clubs, teams, specialized camps, festivals, evenings, conferences, etc. Pupils participate in them according to their interest and desires and parallel with the explanation of their scientific basis they do mainly practical works about nature restoration. The out-of-school types of work are organized by the central and county stations of the young agrobiologists.

The problems of nature conservation in vocational schools are taught in two ways, implicated in the content of the various subjects and through separate courses. The future workers in the material production acquire skills for taking preventive measures from pollution and abilities to eliminate the damages and restore the ecological balance. The separate subjects of nature protection, studied there, are chosen in dependence upon the specific character of the mastering profession. For instance, the textbook for the technical schools of industrial chemistry includes the following matters· "Nature--life," "Sources of nature pollution," "Criteria and standards for top admittable concentration of noxious substances in water streams, atmosphere and soil," "Preventive measures against pollution, legislation and monitoring of the preservation of purity of air, water and soil."

It is evident from the aforesaid that the principles of nature conservation are applied when the content of different subjects in secondary schools is determined in accordance with the specific character of the subject taught in such a way the defined content exerts a convincing influence upon pupils. During the process of teaching of the respective topics in different subjects, teachers try to find out possibilities of coordinating and integrating of ecological knowledge.

Integration of Ecological Knowledge and Skills in XI-XII School Grades

For the senior high school, a programme for a facultative subject, "Man and surrounding environment," is ready and has been under experimentation for two years. A handbook for teachers is worked out. It explains the aims of teaching each topic, the didactic means, the interdisciplinary links and the main problems. The content of each topic is given briefly and also bibliographic references for self-instruction of the pupils is included.

The following unifying ideas are taken in consideration when the curriculum has been worked out:

--nature is an integral system and it is in a constant change and development;

--society cannot exist and develop without constant use of and interaction with nature. History of nature and history of society are mutually related;

--nature possesses value of many aspects for man: development of production, science, art, improvement of health, moral and aesthetic upbringing of personality, etc. Its resources are limited and they have to be wisely and economically used; and

--interaction of society with nature leads to its change. The transformation of nature is possible only when man acquires scientific knowledge about the nature-society interrelations.

The content of the curriculum is divided into an introduction and contains three chapters. In the introduction the essence and the significance of nature protection are revealed, the content of the basic concepts is explained, and the necessity of raising the ecological information of the population is grounded.

In the first chapter methodological, organization and legal aspects of nature protection are looked at. The second chapter deals with natural scientific fundamentals of environmental protection. Knowledge of pupils in different subjects is generalized with respect to the structure and functions of the biosphere. The idea that social laws must comply with objective natural laws is emphasized.

The knowledge included in the first and second chapters prepares pupils theoretically for studying the concrete nature protection problems, that are discussed in the third chapter. The economic development of a given country depends to a great extent on the state of natural resources and the way of their management. This is why the third chapter begins with the problem of natural resources. A special attention is paid to energy resources because their exploitation is the main cause of nature pollution.

The use of natural resources in production depends on the development of the productive forces and on the character of productive relations between people. This requires an explanation of the use of natural resources under the conditions of scientific and technological revolution. The topics that follow deal with the concrete problems of protection of separate natural resources, of the population and nature as a whole. Each component of the biosphere is discussed in the following sequence: state, kinds of pollution, sources of pollution, global and local consequences, protection measures. The abiotic, biotic and human factors of the surrounding environment are considered in their mutual entity.

The important role of human factors for the change and building of the biosphere is underlined. The state and protection of air, water, ores and minerals, soil. plants, animals, landscape and the population are discussed in sequence. Each of the above-mentioned components of the biosphere is closely connected with the rest of them. First of all, the abiotic factors are explained because they create the material basis for development of the biotic factors.

At last, the social factors are dealt with--population and its political organization. The social factors are treated as a part of nature and at the same time as a factor of its change. The interaction between nature and society is studied in its development, in its evolution in dependence on the evolution of the social and political system. From the social problems of political character, it is gone to social problems, caused by damaging the biological essence of man and impoverishment of his genetic pool of human population. The factors that inflict health and genotype of man are explained, the measures taken by our government for health and working capacity of man are discussed. The significance of the optimum living surrounding for harmonious development of personality is given.

The course is finished by practical acquaintance of pupils with nature protection problems caused by the production activity of society: industry, agriculture, mining and construction.

In the senior high school, pupils get concrete nature protection knowledge in their vocational training in such a way that the theoretical knowledge acquires practical sense and significance.

TRENDS OF FURTHER IMPROVEMENT OF ENVIRONMENTAL EDUCATION IN SECONDARY SCHOOLS

In 1979, after a nationwide discussion, the Plenary Session of the Central Committee of the Bulgarian Communist Party adopted a document for further development of education. This document by its character makes more precise and detailed the basic principles of the 1969 education reform and especially with regard to the senior grades of the secondary school, the so-called second and third level, i.e., XI and XII grades. In them, the many-sided development of pupils get its accomplishment. They receive professional readiness and specialize for self-realization in production. On the basis of these documents the further improvement of environmental education is carried out.

The introduction of the newly prepared textbooks, didactic means and guides for teachers in secondary schools is accompanied by an experimental verification for finding out their effectiveness in the school practice. A pedagogic experiment is carried out in definite schools. Scientific workers and teachers observe the acquisition of the basic concepts and skills and search for new ways and methods to activate pupils in the teaching process. The assessment of the effectiveness is done by oral examination, check tests and inquiries. The knowledge, skills and attitudes of pupils are taken as criteria. At the end of the second year in which the new content for a given grade is introduced, discussions on the new didactic aids. textbooks, notebooks, visual aids are organized in counties. Teachers of all schools take part in them. The recommendations for improvement of the teaching documentation including the ecological knowledge and skills, are sent to the Ministry of Education, to the authors of the textbooks and to the publishing houses. On the basis of them, each two years the textbooks, notebooks and the guides are revised with regard to the new achievements in the field of science and of the industrial methods.

The improvement of the environmental education is directed to the following:

- —renovation of the content on the basis of the achievements of science and technology in the solution of environmental problems;
- —improvement of the structure of content and elimination of possible repetitions in the different subjects in grades;
- —revealing the interrelations between the ecological aspects of the subjects taught with regard to the explanation of the objective laws in the man-society-nature interrelations and building up an overall scientific picture of world;
- —finding out new forms, methods and means of more effective transformation of the knowledge into convictions, motives of behaviour; and
- —studying the effectiveness of the content and the methods of its teaching with regard to the building up a responsible attitude in pupils to nature according to their age and individual peculiarities.

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ENVIRONMENTAL EDUCATION IN THE U.S.S.R.

by Innokenti Laptev J.P.*

Environmental education in the USSR at its initial stage was based on the pre-revolutionary experience in this field. Propaganda of the ideas of the rational utilization and conservation of nature can be traced back to the beginning of the last century. Quite a number of environmental societies were created on the initiative of specialists and scientists such as the Society of Promoting Forestry-1832, Forestry Society-1874, Nature Protection Society-1910. The Russian translation of the book "Man and Nature" by an American forestry expert J. Marsh was published in 1866. The period between 1910 and 1912 saw the publication of I. P. Borodin's works on the protection of natural monuments. At the Universities of Moscow and Tomsk fundamentals of ecology were taught, lectures on replenishing forests and wildlife were delivered.

In the early years of the Soviet power on the initiative of V. I. Lenin the large-scale work began on creating the system of rational utilization, conservation and improvement of man's environment. This made it necessary to promote environmental education in this field. In 1924, the All-Russia Nature Conservation Society was set up which began on an ever-broadening scale the activities in the field of nonformal education of the working people and youth. It was done through mass publication of brochures, popular lectures, the work of circles, etc. On the initiative of the Society "Days of Birds" began to be held at schools. Similar societies were set up in all Union Republics. Today they are mass public organizations, their membership amounting to 40 million. Their main aim is to help the government in solving environmental problems. Rules of each of these societies are approved by the Council of Ministers of respective Union Republics.

In the 1930s the educational institutions began training larger numbers of specialists in the field of rational use, conservation and reproduction of natural resources and protection of man's environment.

Nowadays the system of environmental education has been developed and improved. It embraces the entire population from children to adults. A good deal was done to work out theoretical principles and educational methods, to train teaching staff, to provide teaching and visual aids. When doing all this, the recommendations of the Belgrade Working Conference on Environmental Education sponsored by the Unesco and the UNEP (1975), and First Intergovernmental Conference on Environmental Education held in Tbilisi (1977) were taken into consideration.

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Environmental education begins at home and in the kindergartens, continues at general secondary schools, vocational and technical colleges, secondary specialized educational institutions and higher education establishments. The adult working people get the education in the process of a systematic technical training, while specialists and teachers get it at various courses for raising qualifications which are binding on every specialist every four or five years. Extensive nonformal education embraces all strata of the population using all the means of mass media, popular science literature and fiction.

To coordinate all aspects of environmental education and give it methodological guidance there was established a department at the State Committee of the Council of Ministers of the USSR for Science and Technology. Its main function is to control the carrying out of the decisions of the Minsk and Tbilisi Conferences by all the ministries and departments. The heads of the ministries and departments as well as those participating in international seminars and conferences on environmental education submit reports to the department. The department surveys the state of ecological education and gives certain recommendations as to its improvement to the respective governmental agencies, ministries and departments. The department, in addition, examines all the textbooks and teaching aids with a view of working out common requirements to such editions.

In 1977 a Group on Environmental Education was set up at the Institute of Ecology and Evolution Morphology after academician Severtsev; it was staffed with specialists having command of all the main languages. The main task of this group is to gather and generalize the foreign countries' experience in environmental education.

The legal foundation of the environmental education was laid down in the first legislative acts of the Soviet power on the universal education and in the Constitution of the USSR guaranteeing the right to education. Laws on public education stressed that one of its aims is to train specialists having a responsible and thoughtful attitude to nature. Further, decrees of the Supreme Soviet of the USSR (1972), and joint resolutions by the Central Committee of the CPSU and the Council of Ministers of the USSR (1972, 1978) impose obligations on all relevant organizations to improve the training of all students, to disseminate ecological knowledge among the people, to train specialists in the field of rational utilization, conservation and improvement of nature. On the basis of these decrees, ministries and departments of Union Republics issued a number of regulations, some of them having been already enforced. Some lawyers of the USSR put forward the idea of adopting an all-Union law on environmental education; some day this idea may be realized. So far the existing legislation, with the Unesco and the UNEP recommendations having been taken into account, has ensured high level of ecological education of both specialists and public at large.

The development of theoretical and methodological questions of ecological education is vested in the Academy of Pedagogical Sciences of the USSR; within its framework there is a special Problem Council uniting scientists from research and educational institutions of the country. The greatest attention is paid to the following aspects:

--the development of a general conception of ecological education;

--the working out of a system of ecological notions;

--description of different stages of the progress of ecological culture;

--the outlining of practical activities of school children; and

--the ensuring of scientific and pedagogical training and raising the qualification by all teachers in the field of ecology.

Since the Intergovernmental Conference in Tbilisi (1977) the Academy has done a great deal of research and organizational work resulting in the expansion and deepening of the ecological education at schools and kindergartens. It was also promoted by the cooperation with the respective CMEA agencies and by the studies of ecological education in the USA and other capitalist states.

As far as environmental education is concerned the USSR has certain advantages such as complete literacy and compulsory secondary education. During ten years at a secondary school children acquire an essential theoretical knowledge and practical skills which help promote their correct intercourse with nature at the initial stage of their labour activities. In the institutions of further education they get more fundamental knowledge which helps better understand the problem of organization of the intercourse between society and nature. Dialectical and materialistic approach to the analysis of natural and societal phenomena by teachers and propagandists of all kinds adds to the efficiency of ecological education.

Formal education in the USSR begins in kindergartens. In line with the Programme of Education in the kindergartens, children are given information on environment, both animate and inanimate, on relationships and interdependencies between the phenomena in nature, on the significance of natural elements in life and activities of people. They are taught to take care of plants and animals.

At a secondary school, according to the directives of the Ministry of Public Education environmental questions are included in the various subjects taught in schools: natural history, geography, chemistry, botany, zoology, biology. Ecological problems specific to each of the disciplines are reflected in the respective textbooks. This is a realization of an interdisciplinary approach recommended by the Tbilisi Intergovernmental Conference.

According to academician Zverev, at the Academy of Pedagogical Sciences, the following tasks face the ecological secondary education

--learning the fundamental ideas, concepts and scientific facts concerning nature which are essential for a cognition of an optimum interaction between society and nature;

- --understanding the value of nature as a source of material and spiritual benefits for both an individual and the society as a whole;

- --acquiring applied knowledge and practical habits of rational utilization of nature to be able to estimate the state of the environment, to make a correct decision as to its improvement, to foresee the consequences of man's interference;

- --developing the need to enjoy nature both morally and aesthetically;

- --consciously observing the rules of behaviour in the countryside; and

- --actively improving the environment together with an intolerant attitude to people causing harm to nature.

At some schools senior pupils take optional courses on environmental protection. Primary organizations of the Nature Conservation Society are created in the school; they aim at educating children, drawing them into practical activities in the nature protection and improvement.

Vocational technical and secondary specialized education establishments also have these primary organizations attracting students to practical activities. General and special subjects on environmental conservation and the rational utilization of natural resources are included in the syllabus. Secondary specialized education establishments provide this education on a somewhat higher level. They annually graduate 50,000 specialists of the middle group having theoretical knowledge and practical experience in the field of environmental conservation. According to the instructions of the Ministry of Higher and Secondary Specialized Education of the USSR questions relating to nature conservation are taught at secondary specialized and higher schools, the specifics of each particular field being taken into consideration. This is done by including into courses ecological problems on the basis of interdisciplinary approach, but in some higher schools there are general and special courses on environmental conservation. Ecological training of specialists is being constantly improved.

Fourteen universities of the country train environmental conservation specialists capable of conducting research and solving practical tasks. All graduates of environmental protection specialization or specialties carry out diploma work based on the material collected during their field practical work. First-year students of all departments are given introductory course of lectures "Introduction to Your Trade" (4-8 hours); in the following years such courses as philosophy, political economy, scientific communism and special disciplines include most important theoretical and practical questions of environmental conservation. A certain amount of work has been done to create interdisciplinary programmes with a view of coordinating ecological knowledge given within the framework of various courses. Students are engaged in research in Students' Scientific Societies, make reports at their conferences, do practical work as members of primary organizations of the republican Nature Conservation Societies.

The training of specialists for practical accomplishment of environmental protection measures is conducted in the following specialities: purification of natural waters and sewage (12 higher schools); collection and utilization of dust and gas, utilization of gas and mazut and air protection, hygiene and sanitation (21 higher schools); recuperation technology of the secondary materials of industry (8); water supply and protection of water resources in rural areas (2); ichthyology and fish-farming (3); hunting (2); forestry (19) and others.

The higher schools graduate annually 40,000 young specialists capable of dealing with environmental protection problems, the number increasing every year.

Those specialists who have higher education but have no ecological training take refresher courses in special departments at Moscow and Leningrad Mining Institutes, Leningrad, Rostov and Byelorussian Universities, and Leningrad Technical Institute of the Pulp and Paper Industry.

To promote the training of highly-qualified specialists in this field through post-graduate courses and defending thesis the Highest Qualification Commission of the Ministry of Higher and Secondary Specialized Education determined a number of specialties and set up the Scientists' Council for this purpose.

There emerge new trends in environmental protection activities; the already existing problems are becoming ever more acute. Thus, economic aspects, ecosystem modeling, creating automatic data banks of the "nature" type, using environmental information from sputniks, many-sided nature protection both in rural and industrially-developed urban areas, counting and planning in the field of environmental conservation are acquiring ever greater importance. In the near future there will be a great demand for specialists in all these fields; hence the necessity to set up environmental departments and a number of new specialties.

School children and students expand and consolidate their theoretical ecological knowledge participating in practical environmental activities. More than 300,000 school children work in more than 6,000 school forest areas, take part in detachments of blue and green patrols, plant trees and flowers, feed birds and fish. Vocational school students work in the parks, gardens and squares, look after ponds, work as part-time nature conservation inspectors. Higher school students also work as part-time inspectors, look after recreation zones, combat poaching.

The system of formal education has now a great number of textbooks and study aids at its disposal. Thus between 1968 and 1978 alone, 216 textbooks, study aids and methodological materials for higher, and vocational, and specialized secondary schools, general secondary school and kindergartens were published. Since 1978, dozens of new, and much better, textbooks have been published. They concern all problems of environmental conservation, such as protection of atmospheric air, water, soil, mineral resources, wildlife, plants, etc. Lecturers and teachers make a wide use of both home-issued and translated studies on various aspects of environmental conservation (philosophical, social, economic, pedagogical, systematic, organizational, recreational, etc.). These studies present the environmental problems on a high scientific level, making use of latest research data both at home and abroad.

The system of nonformal education has been much expanded owing to the resolutions of Tbilisi Intergovernmental Conference (1977) and Minsk All-Union Conference (1980). It includes propaganda of ecological knowledge by lecturing groups within the framework of republican Nature Conservation Societies and All-Union "Znaniye" society, by mass media, by all kinds of refresher courses, by technical training at industrial enterprises. All this promotes ecological education among all strata of the population.

The Soviet people are known to subscribe to many periodicals, listen to the radio and watch TV, all these mass media being involved in the propaganda of ecological knowledge. Film studies have already released and continue releasing films about environmental protection. In 1977-1979, 135 black and white and colour films were released including, "The Price of Purity," "Battle for Water " "Nature and Us," "Oil and Nature," "Time to Think Ecologically," "Lakes Must Live," "Biochemical Purification of Water," "Protection of Forests," "Seas Must Be Clean," "Take Care of Biosphere." Simple movie projectors which are easily available make it possible to widely use these films.

Series of slides are released, both white and black and colour, concerning most topical problems of environmental conservation, including Darwin Preserve, Altai Preserve, Astrakhan Preserve, the USSR Red Book, Nature Conservation in the USSR, Kurile Isle and others. Coloured posters are printed in great numbers. Postage stamps, matchbox labels, postcards are also used as a means of ecological propaganda. In the woods, on river banks there are placards calling for protecting nature.

Great numbers of people are involved in large-scale propaganda work done during all-Union environmental operations, such as Month of Forest Day of Birds, Year of Birds, International Day of Nature Conservation, "Muravei" ("Ant") operation, etc.

As to periodicals, each covers the environmental themes according to its trend, there being published about a hundred of them. Even humorous magazine "Krokodil" is not alien to these problems. Magazines "Priroda" ("Nature") and "Nauka i Zhizn" ("Science and Life") treat these problems more seriously than others. Since 1981 a new magazine, "Nature and Man," has been issued by the Hydrometeorological Service of the Council of Ministers of the USSR.

The "Znaniye" publishers put out about 1.5 million booklets every year. The number of lectures on environmental problems delivered annually by lecturers from the Nature Conservation Society amounts to hundreds of thousands. The number of lectures given and seminars held by the activists of the republican societies amounts to three million.

Regional and district exhibitions devoted to the environmental conservation have become popular. They are a kind of account of all organizations responsible for the protection of the environment before the working people. At the head of this kind of propaganda is the Exhibition of National Economic Achievements of the USSR. Nature conservation questions are dealt with in great detail in the "Nature Conservation in the USSR" pavilion as well as "Public Education," "Chemical Industry" and "Agriculture" pavilions of the exhibition. Thousands upon thousands of people come to see these centres of environmental education every year.

All museums of regional ethnography have departments of natural environment which propagate rational utilization, protection and reproduction of natural resources in close connection with the specific tasks facing the given region.

During recent years republican Nature Conservation Societies have set up well-equipped "Houses of Nature." There are 120 such houses in Russia alone. All schools have nature rooms where expositions concerning environmental protection are often renewed.

Purposes of environmental education are also promoted by scientific and practical conferences on the problems of the protection of particular natural resources or on the environmental protection in the sphere of particular industry, held in republics, regions, areas and towns. There are dozens of such conferences held every year all over the country.

State bodies and public organizations activities aimed at expanding both formal and nonformal education in the USSR have already yielded certain positive results. There is not a governmental department or agency that wouldn't deal with the questions of environmental conservation. All research societies, including Moscow Society of Nature Explorers, All-Union Geographic Society, Botanic Society, Hydro-Biological Society, Soil Scientific Society, Chemical Society and many others, as well as numerous technical and scientific societies pay great attention to the environmental problems. All technical projects have special environmental sections. Lectures on environmental conservation are given and seminars are conducted for party and state officials. The activity of the working people and the youth has been increased. Trade union, Komsomol and pioneer organizations do their best to draw the working people and the youth into solving the tasks of environmental conservation in practice.

Due to joint efforts of state and public organizations the state plans of rational utilization, conservation and improvement of nature are being successfully implemented. Thus, it is for ten years now that the forest areas have been expanded in spite of increasing timber-cutting. The atmospheric air in many industrial centres has become cleaner, the rivers have become cleaner, the stocks of fur-bearing animals and industrial fish are being increased, ever larger areas of eroded soil are being recultivated, the areas of irrigated soil are being steadily increased, the areas of preserves and aquatoria are being expanded, rare and endangered species of organisms are being revealed and taken under protection with the second edition of the USSR Red Book. New wasteless technologies are being developed and old ones are being improved; the wide utilization of secondary resources from industrial wastes is being studied. There are many other achievements as well.

To be sure, there is still much to be done in the field of environmental education in the USSR. Some higher school establishments do not practice an interdisciplinary approach. Some of them lack interdisciplinary curricula for the whole course of studies. Not all handbooks and study aids meet new requirements; higher schools are not staffed with trained lecturers and teachers; some other shortcomings have been recognized and are being dealt with by all the establishments of formal education. The guiding lines for these efforts are provided by the materials of the First All-Union Conference of Environmental Education held in Minsk in 1980.

GENERAL REVIEW OF ENVIRONMENTAL EDUCATION IN CHINA

Wang Huen-pu*

Due to the lack of planning for scientific and reasonable utilization of natural resources, among world-wide problems are the waste and destruction of biological resources, forest denudation, grassland degeneration, constant spreading of desert soil erosion and pollution of atmosphere and water systems. If we do not adopt appropriate measure to strengthen natural conservation, the results will be disastrous. Mankind has more and more recognized that, environmental education is a fundamental step for natural conservation. Recently, although environmental education in China has aroused strong attention by the authorities, it is still far from the demands of present situation. Several situations were enumerated as follows:

I. Environmental education in schools

A course of environmental education is taught in schools, recently, and people have increasingly realized its important role. Different kinds of schools are in consideration of this problem.

A. Environmental education in university

Recently, a course of environmental education, "An Introduction to Environment Sciences," was taught in Geography Departments of some universities, which mainly included subjects such as material cycles and energy flow in environment, atmosphere environment, water environment, soil environment, regional pollution survey and environmental monitoring, evaluation of environmental quality, regional environmental quality management and policy and natural conservation, etc. Besides teaching some basic knowledge, major areas of the world, especially in China, were also introduced. Similar courses were also taught in Departments of Biology and Chemistry of some universities and Agricultural and Forestry Colleges. Departments of Environmental Conservation or Environmental Chemistry have been established in some universities in order to train qualified technicians. Now, establishing an independent environmental college for wider training of researchers, technicians and teachers of environmental sciences is under consideration.

B. Environmental education in middle school

There are no special courses of environmental education in middle school, only some chapters about environmental conservation in earth sciences and demography courses of senior middle school and in geography courses of junior middle school. The contents are very simple. It seems that a specific course of environmental education must be given in order to satisfy the practice needs.

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C. Environmental education in primary school

It is very important for the early youth to have environmental education from the beginning of primary school. Thus they could understand and love nature from teen-age, and realize the law of interrelationship between human and nature, with the increasing of their age. But, now, there is only a little content of environmental education in general knowledge courses. This may be worthy of study and improvement.

D. Environmental education in nursery school

Children's interest in nature in preschool may be heightened by telling stories, introducing general knowledge of nature and impact of human activities on nature as well as significance of natural conservation. A textbook in this aspect should be compiled to supply the teaching and referencing of environmental education.

II. Environmental education out of school

A. Propaganda and education of newspapers and publications

Recently, many newspapers have published articles on the "Environmental Protection Law" and "World Conservation Strategy." Furthermore, a great many papers engage in scientific research pursuits, such as "love birds week," discussion on ecosystem and ecological balance, city and rural construction, etc. All of these play a very important role in environmental education. Many periodic publications, such as "Journal of Environmental Sciences," "Journal of Environmental Conservation," "Journal of Ecology," "Journal of Plant Ecology and Geobotany," "Journal of Natural Resources," "Wild Animals," and "Nature," also have published several series of papers related to environmental education.

B. Exhibition of natural conservation

Some institutions held many exhibitions in order to propagate environmental education to the masses. But the one of broadest scale is the exhibition of natural conservation in China jointly sponsored by Environment Protection Office of the State Council, Chinese Zoological Society, Chinese Association of Museum of Natural Sciences and Beijing Natural Museum held from April to June 1982. Its main contents include the following: 1) general knowledge of ecosystems; 2) disastrous effects of ecological balance dislocation and good types of ecological balance; and 3) establishment and planning of natural protected areas. This exhibition is touring the country. Henceforth, the Exhibition Hall of Ecology will be established in Beijing Natural Museum as a special place for environmental education.

C. Shooting film and television about natural conservation

Films and television are a good form to carry on environmental education. We emphasize this important means consistently. For example, the "panda" film was well received by the masses both in home and abroad. The films related to natural protected areas, wild animals and plant protection occupied a definite proportion among the scientific films, but it needs further augmentation.

D. Special lessons by radio

These are also good ways of developing environmental education. Recently, Chinese Ecological Society and Chinese Environmental Society vigorously propagated general knowledge of ecosystems, significance of natural conservation, and their relation to economic construction in systematic lessons by means of radio broadcast, and achieved desirable results.

E. Conducting training courses for cadres

In order to conduct the work of natural conservation well, it is important to carry out environmental education for the masses; the policymakers must understand the significance of natural conservation and its relations to economic conservation. Now, natural conservation has become a component part of national economic construction. Conservation and rational utilization of natural resources are the important factors. Therefore, our authorities entrust some universities with responsibility for conducting training courses for cadres, lecturing them on basic curriculum for natural conservation. As they return to their past, they can lead economic construction by use of this theoretical knowledge.

Although we have done some work in environmental education, our efforts are still far from meeting the needs of practices, especially since China is a country with large population, and backward industrial and agricultural productivities, along with the steady development of economic construction, it is necessary to exploit natural resources. This will lead to incisive contradiction with natural conservation. It is thus clear that environmental education is a long-term and arduous task.

ENVIRONMENTAL EDUCATION IN THE DOMINICAN REPUBLIC

by Dr. Sophie Jakowska*

The favorable climate for conservationist and environmental work that prevails today in the Dominican Republic is the product of many years of silent activities performed by a small number of dedicated persons. Their preoccupation with the environmental dangers associated with the sudden demographic and economic growth, and the consequent impact on the native endangered species, has been known abroad through private contacts with foreign collaborators, but no concerted effort was made to consolidate the conservation conscious Dominicans.

The need for action came into the open in January of 1977 at the First International Encounter on the Conservation of the Fauna of the Dominican Republic, organized by the Center for Research in Marine Biology (CIBIMA) of the Autonomous University of Santo Domingo.

This public meeting with the IUCN expert on crocodiles was perhaps the first instance of sharing of information and suggestions by institutions that up to that time have kept rather isolated from each other. CIBIMA became the first Dominican institution member of IUCN, and was soon followed by others.

An informal group of people attending the meeting organized as "friends of nature"; this movement later developed into the Dominican Society for the Conservation of Natural Resources.

CIBIMA made immediate plans for the International Colloqium on Conservation Practice, which was held at the end of May 1978, with a greater participation, including representatives of international conservation groups such as IUCN, the Audubon Society, Sierra Club, New York Zoological Society, Caribbean Conservation Corporation, and others.

This meeting may be considered as a milestone in Dominican conservation, although it was preceded by mutual agreement between the organizing groups by the first seminar on the Conservation of Living Natural Resources of the Hispaniola, held in March of the same year under the auspices of the ZOODOM and the National University Pedro Henriquez Urena. The latter, of more formal nature, included contributions from the neighboring Haiti.

The format of the Colloquium on Conservation Practice permitted ample exchange of views. The expeditions to a marine environment, the mountain range and the hypersaline Lake Enriquillo were intended as a practical educational experience.

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The working papers prepared for this colloquium represent an unprecedented collection of information on plants, animals and habitats that deserve protection with recommendations on the type of protection they should receive. A preliminary survey of the known environmental problems affecting water, soil and air was also included. There was also a list of exotic species of animals introduced in the Dominican Republic and the problems that these are causing. All these data were compiled from the answers to a questionnaire distributed to institutions and qualified persons. The document, distributed to the participants, also included physical, demographic and economic data, with a set of pertinent maps, a directory of organizations and institutions involved in some aspect of conservation, as well as a list of active naturalists and biologists involved in conservation-related research and of serial scientific publication appearing in the country.

The Permanent Scientific Committee on Conservation Practice, created by a resolution at the final plenary session of the colloquium, organized in working teams on specific topics, began to meet in the middle of June 1978, and delivered a document containing the recommendations which was distributed to the participating institutions and agencies concerned with conservation. The document contains a section on education and popularization of conservation knowledge, which recommends, among other things that the colloquium papers be made available to secondary school and university professors teaching subjects related to conservation. It recommends making a greater use of qualified Dominican personnel in conservation education and to prepare textbooks in natural sciences and biology in which native flora and fauna are used as examples.

These scientific events have had considerable educational impact on the participants and on the observers from the news media. They also strengthened the cooperation among the Dominican academic and nonacademic groups through the recognition of the potential and specific role of each in the conservation movement.

Earth Day 1979 brought into focus all the forces available for environmental education in the Dominican Republic. Members of the Permanent Committee for the Annual Celebration of Earth Day included representatives from all the academic and government institutions concerned with natural resources. It was a kind of informal inventory of manpower and teaching materials.

That year the activities on June 5 were many and diversified, ranging from ecological games for children to a scientific symposium where environmental problems of the Dominican Republic were analyzed by experts. However, it was generally agreed that the lack of specialized personnel and of an educational structure necessary to bring the environmental message to the masses would remain for some time the limiting factor in the conservation movement.

Various branches of the Dominican government concerned with natural resources were reorganized in 1979 into more efficient units and have written specific plans. Each of these branches considered education high on its priority list.

The Technical Secretariat of the Presidency, a government unit directly attached to the presidential office, has an active Department of the Environment and of Natural Resources which has an important role in establishing the underlying principles for the definition of plans and programs in specific areas of government action. Thus, it influences the philosophy and the policy in different environmental sectors. It supports and sponsors activities that relate directly to the development of environmental projects and education. This includes national and international conferences and symposia.

Conservation is supposed to be taught in pre-university and primary schools as part of the natural sciences program, but it has not been officially integrated to date, except for the first few elementary levels, within the Program of Population Studies.

An interdisciplinary and interinstitutional post-graduate program in conservation and environmental protection (environmental culture) was proposed in 1979; innovative in its conception, it remains in limbo. As far as the role of the Ministry of Education in the field of conservation and environmental protection is concerned, little can be accomplished until more educators in executive positions are exposed to the scientific and ethical experts of these disciplines. Moreover, mechanisms must be created to incorporate conservation conscious personnel in the educational system.

Two institutions, however, should be given the credit for preparing such personnel in the Dominican Republic: CIBIMA, the Center for Research in Marine Biology of the Autonomous University of Santo Domingo, and ZOODOM, the National Zoological Park, administered by the National University Pedro Henriquez Urena.

CIBIMA, as the first and only academic institution in the Dominican Republic dedicated to research and teaching in aquatic sciences on the university level, has included since 1962 the conservation and environmental philosophy in all its projects. It sponsors dissertations for the degree of Licenciado en Biologia and post-graduate institutional research on species and habitats that deserve protection. As a result, CIBIMA trains conservation conscious investigators and produces a substantial body of scientific publications with a definite conservationist concern.

CIBIMA's Program of Conservation and Environmental Protection includes lectures, talks, slides, films, discussions, as well as the initiation and follow-up of conservation projects for schools and interested groups. It has produced the first books on conservation and environmental protection written especially for Dominican children, didactic materials intended for primary and secondary school teachers, and a plan of a post-graduate interdisciplinary study. Encounters with primary and secondary school teachers are frequently held.

ZOODOM, even before the formal inauguration in July 1975, recognized the priority role of a Department of Education in a zoological park and the need for the adoption of a conservationist philosophy to help mold motivations and attitudes necessary for individual and group cooperation in the solution of existing ecological problems. Thus, the first program for university graduates who now serve as zoo instructors for school groups and their teachers, was started in July 1973.

Zoo staff attempt to make up for the lack of practical field and laboratory experience in primary and secondary schools by providing some of these within the format of school visits to the zoo, or visits to schools by the zoo personnel. Special courses in conservation and environmental education is offered for handicapped children, and for rural and urban teachers. A new program for the family visiting the zoo if offered on weekends, and includes a documentary on ecology and an experience in the "minilab" with specimens that children and their parents can see, hear and touch.

The educational publications of ZOODOM include a zoo magazine with the same title, a children's book about crocodiles that are being raised in ZOODOM, and a report on the education program of the National Zoological Park, 1979-1980. A bulletin on environmental and conservation education was started in 1980.

Thus, CIBIMA and ZOODOM carry on work in conservation aimed principally at the school-age population of the Dominican Republic, as well as with other sectors of society, where there is great need for this type of education in the absence of an official program.

The National Direction of Parks of the Dominican Republic started the Department of Education in March of 1979. Its purpose is to create an awareness of the importance of preserving the areas set aside as parks, or other forms of protected environments, among the neighboring populations that often damage public resources for fuel and for short-lived agricultural uses. Priority is given at this time to the National Parks Armando Bermudez and Jose del Carmen Ramirez, in the Central Mountain Range, which represent the principal forest reserves of the country and the area of origin of the major rivers.

Courses are offered to rural leaders and school teachers stressing the need to preserve these areas and teaching the rational use of the forest. A text for group instruction with a set of posters emphasizes the importance of trees for the water supply and the stability of the climate. The courses have given rise to the concept of a "community forest," land which is purchased and planted with trees to be used for local construction and fuel. When established, this community experiment will convert into an informal school of conservation.

Other educational activities of the National Direction of Parks include the publication of a children's book dealing with crocodiles of the Isla Cabritos National Park, a booklet for park visitors, and informative calendars: in 1979 one that shows 20 species of animals protected by law in the Dominican Republic, and in 1980 four different issues with the views of the principal national parks. A traveling exhibit, stressing the scenic and esthetic values, is directed principally at the urban population. In the second trimester of 1980 about 25,000 people, principally high school-age, have been exposed to this conservation message. It is estimated that this exhibit will be seen by some 150,000 people in the capital, the provinces and at international meetings of geographers and conservationists.

The Management Plan for the National Park del Este represents the first plan elaborated in the Dominican Republic for the management of a national park and will serve as an educational tool.

The National Direction of Forests, in charge of the exploitable wood reserves of the Dominican Republic, has a School of Forestry in Jarabacoa for training foresters and forest wardens. It promotes the annual activities of Arbor Day, early in the month of May, with tree planting by children and community groups. Posters produced in the early 1970s carry the conservation message to the rural dwellers in familiar terms. There is an excellent "preserve the forest" announcement over the official radio station of the armed forces.

The Ministry of Agriculture is involved in conservation education through the activities of the Department of Environmental Education of the Subsecretariat for Natural Resources. The former Fish and Wildlife Department has been reorganized into the Departments of Wildlife and of Aquatic Resources which contribute to education in their respective areas. Both departments are in charge of applying the existing laws that protect the endangered species and have observed in the field that much damage to the resources occurs due to the ignorance of conservation principles and practice. On the local level, efforts are made to stress that rational use of resources ensures their future existence, rather than to enforce the regulations.

Due to the acknowledged shortage of specialized personnel, both Departments organize courses in Conservation and Resource Production for their professional staff, as well as for inspectors who work with local populations. Fishermen and commercial divers receive conservation-oriented instruction in fishing methods. Hunters are approached concerning the value of their takes in terms of a continuing natural resource. However, until the new law regulating such activities is passed, it is difficult to develop a coordinated plan of action.

Natural Resources staff is involved with regional activities and with civic groups as lecturers and discussion leaders. Special attention is given to the natural science teachers and the vocational needs of students interested in conservation-agriculture and members of the armed forces.

Posters produced by the Department of Environmental Education carry excellent conservation messages. Publications contributed by the staffs of the Department of Wildlife and of Aquatic Resources include a book on protected animals, a booklet on the Japanese quail, a glossary of terms used in water and soil conservation, practical manuals for small farmers, as well as technical papers such as the inventory of the physical and biotic resources of the region of Lake Enriquille, which appeared in June 1980. The Wildlife Department also prepared a translation of the article on the solenoden by J. F. Brandt, published in 1837, and of a more recent North American study of this rare native species.

Presently the Department of Environmental Education is extending its message through all the media: government television channel, radio, and in the weekend supplements of the newspapers of major circulation. Experts from the Subsecretariat of Natural Resources contribute to the local press. All the educational activities are well funded and based within the established regional administrative system of the Ministry of Agriculture. However, the dependence of these programs on the university production of professionals with a background in conservation is obvious. Funds will have to be assigned not only to those schools where conservation might be taught in the context of agricultural sciences, but also to those with a more academic tradition of conservation philosophy and a proven ability to contribute conservation-conscious specialists in various disciplines to the government service.

The Botanical Garden in Santo Domingo, named after the first and foremost student and collector of the Dominican flora, Dr. Rafael Moscoso, opened in August 1976 with an established Department of Education. This department aims to promote the love of nature, the care for the plants, and the interest in the study and preservation of the Dominican flora. In the first semester of 1980, 181 schools with a total of 13,334 pupils visited the Botanical Garden. Special programs are offered to schools by previous arrangement and a variety of courses are available to the public. The latter include horticulture, garden design, care of plants such as orchids, flower arrangement, bonzai, etc. A course in ecology is being organized for primary and secondary school teachers.

The publications of the Botanical Garden include a trimestral bulletin, a booklet on ferns and their culture, and a botanical dictionary of common plant names of Hispaniola. The Herbarium, which forms the scientific basis for the educational work of the institution produces a scientific publication named Moscosoa.

The Botanical Garden sponsored two plant exhibits for the general public under the name of ISLA FLORA, with the participation of different institutions which stressed conservation education. In 1980 an exposition of ornamental plants was sponsored jointly with a women's organization "Mujer 2000."

The National Museum of Natural History is an institution with a great potential for conservation education. The present work of collecting scientific data and specimens, the preparation of scientific publications and exhibits, all have great educational value. At this moment the museum staff carries out a number of collaborative projects on international level, which contribute the much needed information on some of the most interesting species and habitats of the Dominican Republic. Museum members are also dedicated lecturers to conservation-oriented audiences.

The Ecological Society of Cibeo is the oldest regional conservation organization with national aims. In 1980 it organized an expedition to one of the highest mountain peaks and it started a tree planting program along the river Yaque del Norte in coordination with the Ministry of Agriculture. The society publicizes environmental damage, such as the destruction of the forest on the mountain D'ego de Ocampo, it fights to protect the lagoon of Cabarete in the north, near Puerto Plata, it denounces the destruction of wildlife and protects the mangroves of Samana. Public education in conservation and environmental protection is high on the priority list, and is achieved in part through its organ, Actualidad Ecologica. Contributors include members of the faculty of the Catholic University located in Santiago.

The Dominican Society for the Conservation of Natural Resources (SODOCORENA) is the legal offspring of the "friends of nature," an informal conservationist movement which originated during the international meeting on conservation of the fauna of the Dominican Republic held in CIBIMA in January of 1977.

The monthly sessions of this organization, featuring talks, illustrated by slides or films, are regularly attended by members and interested persons. Members participate in field trips and conservationist family outings. An ecology course, offered by different experts under the auspices of SODOCORENA in March 1979 was a clear demonstration of the great need for conservation education. Some 300 persons, the majority high school and university students registered for the course.

SODOCORENA tries to teach conservation by expressing its views on environmental issues. It also sponsored a variety of activities held in the Botanical Garden on the occasion of Earth Day, all of them of educational nature and directed at family groups.

Foundation of San Jose de Ocoa is an active soil conservation group which started as a Catholic parish community action. With the help of foreign consultants it contributes significantly to conservation education in the rural area.

The Dominican Botanical Society and the Dominican Ornithological Society, through their membership that reads as a partial roster of Dominican conservationists, are involved in individual and group projects dealing with the protection of endangered species and their habitats. The Orchideology Society is active in the same way. Laymen participation in the activities of these societies helps spread the conservation message.

The Dominican Academy of Sciences, although predominantly composed of historians and other social scientists, has been favoring with grants research projects that contribute to conservation education, such as the study of mangroves or other aspects of Dominican flora.

The latest conservation organization was founded in April 1980 in Puerto Plata, as "Friends of Nature." The members include professionals and educators with many years of interest in the protection of native birds, orchids and other endangered species. The group is interested in protecting some of the exceptional habitats in the region, which are already suffering the impact of the tourist boom in this area of the

Atlantic coast. The group sponsors lectures for members and for the local schools and is presently collecting books for a "naturalist's corner" at the city library and for the library for their own members. It is involved in conservation education on the community level.

Other informal conservation groups are springing around the country in communities that receive visits of conservation lecturers and discussion leaders. Apiculture activities also serve as an educational tool, while diminishing the use of destructive practices among the rural population.

Among civic organizations, the Dominican Association of Scouts is outstanding for its conservationist philosophy and activities. It involves more than 5,000 youngsters. In 1978-79 the organization started the National Conservation Plan with the purpose of increasing its action in reforestation, tree planting, soil and water conservation, and plant and animal protection. The educational programs with lectures by experts and field experience are intended for every age on national, regional, and scout troop level.

The Scouts adopted a conservation code which reads: "As a scout I promise to protect and faithfully defend the natural resources of my country, its soil and minerals, its forests, water and wildlife."

Troop 6 "Quisqueya" of Santo Domingo participated in the International Colloquium on Conservation Practice by contributing information on environmental problems and species that deserve protection which they detected in the course of their fieldwork. They also serve in various capacities in conservation educational events.

The Rotary Club, District 406 of the Dominican Republic, with 31 clubs in the capital and the provinces, has established a Committee on Conservation of Natural Resources in 1977. Among its members the Rotaries count a number of prominent professional conservationists. In 1979 experts offered 15 lectures on conservation to different clubs. Tree planting is part of the general program.

The Lions also show interest in conservation of natural resources and welcome experts who are willing to offer lectures to their clubs.

The Jaycees, an offshoot of the Chamber of Commerce, composed of younger people in the business world, have been particularly active since 1972. In 1979 the theme adopted for the activities was "Man and his Environment" and the theme for 1980, "Energy," is presently jointly developed by the local groups.

The women's branch of Jaycees participated in the Earth Day celebrations held in the Botanical Garden in June 1980. Presently the group is preparing a fair under the title of "FLORAMINA" which will be held in September of 1980 and will stress the importance of plants for the quality of the environment in which we live. The group turns to active conservationists for cooperation in the event, in form of lectures, slide shows and exhibits.

Much of the conservation education for the general public in the Dominican Republic still depends primarily on private initiative.

Naturalists and biologists are in great demand for career orientation of students, group meetings with teachers, professional and youth groups, and with interested citizens on community level. Some of them make regular contributions to the major newspapers reporting on trips to areas of ecological interest, national parks, or on native species of plants, birds, etc.

Saturday supplements to papers in the capital often carry pages of conservation-oriented material written by scientists or newspapermen. Recently CIBIMA was given the credit for stimulating conservation-oriented journalism by the writer who gained a well-deserved prize in science reporting for 1979. His articles, describing the scientific expeditions to some of the most interesting habitats in the Dominican Republic, continue to appear every week and are filled with valuable information and a strong conservation message. The supplement for children in one of the afternoon papers reprinted various pages from a conservationist book for Dominican preschool children.

A Catholic monthly, credited with the largest circulation in the Dominican Republic, has incorporated environmental education starting with the June 1980 issue, with an article dealing with conservation ethics contained in the Puebla document, prepared by the Conference of Latin American Bishops. The same article was also distributed to all the dioceses of the Dominican Republic by the Archdiocese office in Santo Domingo.

A magazine called "Ecologia y Conservacionismo" has appeared for some time in Santo Domingo through private initiative. It reprints valuable articles from international conservation organs, as well as commentaries on matters of ecological interest. The same publisher reprinted the conservationist manual, "Hazlo y muestralo."

Private initiative is also involved in the production of natural science texts stressing multiple uses of the natural resources and the conservation message for the first three elementary grades. Nothing is known to date about the adoption of these texts in public and private schools.

Other conservation didactic materials have also been privately sponsored: ecological essays dealing with problems in the Dominican Republic are a useful reader for high school and university students, and "Sons of the Earth," the first book of "meditations for children and adults on conservation of natural resources and environmental protection" in the Dominican Republic, which is considered by some to be a poetic presentation of conservationist philosophy.

The high cost of printing in the Dominican Republic limits the production of much needed educational materials. Books, essays and other publications are soon "out of print" due to the small initial printing. Major industries that alter the environment as a result of their activities should become involved in sharing the responsibilities for environmental education and subscribe to new mass editions of some of these "out of print" publications. A major national effort in environmental education, however, requires more than private initiative and must receive substantial government funding.

In a country where education services are admittedly deficient, it should be possible to develop from scratch a new structure for mass instruction that would incorporate the vital conservationist knowledge and ethics. To accomplish this, the Ministry of Education must seek the help of Dominican specialists presently not on the ministry payroll.

The principles of environmental ethics have been presented to the public by a leading biologist in 1979, and by a foremost naturalist in 1980. The concepts of rational utilization and development of aquatic resources, without violating the critical habitats, have been repeatedly advocated by CIBIMA's leading investigator. The time has come to teach these principles to the masses and to break the chain of anticonservation activities bred by ignorance and poverty.

In the normal course of events it may be hoped that soon the climate will improve for mass education in conservation and environmental protection in the Dominican Republic.

The Dominican Republic may consider itself fortunate to have a small but vital nuclei of dedicated native naturalists and biologists who carry on studies on the flora and fauna, and the use of land and water resources. Without a strong autonomous research, in close touch with the international conservation movement, there can be no effective educational program on national level.

The urgency of conservation measures in tropical and subtropical regions such as the Dominican Republic makes it imperative that educational efforts be directed at once to all education and population levels. The production of specialized personnel capable of training others cannot be accomplished without the established university programs on undergraduate and post-graduate levels, and one cannot depend on the effectiveness of now untested programs. Thus it is logical that emphasis be given to the training of specialists in biological disciplines within degree granting university programs, and to training urban and rural teachers within the continuing education "in service" programs, such as those presently carried out with the help of some institutions.

Since the various branches of the Dominican government, including those concerned with tourism, are placing increasing emphasis on the importance of the natural resources and their preservation, the need for personnel trained in conservation and environmental protection will continue to grow. This mutual dependence, and cooperation, between the country's academic and other institutions should translate itself into a fruitful effort in the field of conservation education.

DEVELOPMENT OF ENVIRONMENTAL EDUCATION IN SINGAPORE

by Richard C.B. Lim*

The Republic of Singapore has a population of just over 2.41 million persons (1980 census, Singapore) living in an area of 616 square kilometres. This gives a population density of over 3,918 persons per sq. km.--the second highest in the world. The island of Singapore is low-lying and flat with the highest hill no more than 166 metres. Singapore's immediate neighbours are Peninsular Malaysia to the north and Indonesia to the south and west.

Situated almost at the Equator it is subjected to a high annual rainfall, high humidity and warm temperature.

CAMPAIGNS

These physical, geographical and climatic attributes together with the current rapid pace of urbanization and industrialization make Singapore vulnerable to environmental pollution. Thus, keeping Singapore clean is a crucial problem. There are also broad considerations in making Singapore a clean, healthy and green garden city. A clean and litter-free Singapore would raise national morale and civic pride and mean great economic advantage in attracting tourists as well as industrialists to invest in Singapore. More importantly, a clean city will improve the health and living conditions.

Early efforts in environmental pollution control relied mainly on providing an efficient public cleansing service with little or no community participation. However, it was soon realized that without public cooperation even the most efficient service cannot achieve the desired results.

Against this backdrop, an ambitious plan of action was launched. In 1968, the "Keep Singapore Clean" campaign spear-headed the first national effort to bring about public participation in an environmental programme. A National Campaign Committee was formed and this was headed by the Minister for Health and comprised representatives from government ministries, statutory boards and private organizations who planned and coordinated the activities of the campaign.

A preliminary measure taken before the campaign was the amendment and updating of outdated public health laws and enacting of more effective new laws. The provisions of the new laws had to be publicized and explained to the people during the period of the campaign, usually a month long to gain acceptance of the majority of the people.

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These national educational campaigns have been repeated after 1968 to reinforce the public's awareness of their social responsibility and role in improving the quality of our environment. Specific health hazards were highlighted each year.

As in most major cities of the world, Singapore is also confronted with the problems of pollution of the environment resulting from rapid urbanization and industrialization. The government realizes that economic development shall not be at the expense of too heavy a social cost for ultimately economic development has as its goal the improved welfare including the health of the community.

FORMATION

A major step forward towards a better environment of Singapore was made in 1972 by the formation of the Ministry of the Environment.

This Ministry took over the responsibility of environmental health including public cleansing from the Ministry of Health, as well as sewerage and drainage works from the Ministry of National Development so that all anti-pollution and related matters could now be under one Ministry for concerted and more effective action.

The objective of the Ministry of the Environment is to maintain a high standard of environmental public health and cleanliness through preventive and other control measures.

The functions of the Ministry of the Environment are: environmental public health control; sewerage and water pollution control; and drainage control and flood alleviation.

Under the environmental public health division are solid waste disposal services, port health services, epidemiological investigations, vector-borne disease control, food hygiene control, hawker control and licensing, as well as public health education. "Environment" therefore embraces a wide area from provision of modern sanitation to food hygiene to keeping Singapore clean and infectious disease free.

ENVIRONMENTAL PROBLEMS AND ISSUES

Land Scarcity

As one of the most densely populated cities in the world with over 3,918 persons per sq. km. there is a big demand on land space. Much of the environmental problems of concern are related to urbanization and the rapid development of land. The problems are further aggravated by the rapid growth of industries and public housing programmes and the ever-increasing demand for commercial land space in the city centre.

Industrialization and Pollution

Rapid industrialization and intensive urbanization have not only made a greater demand for water supply but also have increased discharges of industrial and domestic effluents. Water pollution and air pollution (from cars and industries) are areas of concern for environmental control.

In land-scarce Singapore, devoid of abundant natural water supply, there is a vital need to conserve water. Water is supplied mainly for drinking, domestic, industrial, public cleansing and fire-fighting. Consumption of water will have to be met within the constraints of land scarcity and high population density. Apart from impounding runoff from the central protected catchments, runoff water from unprotected rural catchments are also now utilized for treatment to a high quality water supply.

The main sources of water pollution include indiscriminate discharge of refuse, debris and liquid waste into the water courses. Therefore, water flowing in the drains and canals must not be allowed to be polluted or littered.

Solid Waste Disposal

With a high population density, growing pace of industrialization, improved standards of living and greater use of packaging of consumer goods, and rapid building construction and demolition, the amount of refuse being disposed of is increasing. Currently, about 2,700 tonnes of daily refuse are removed to sanitary landfills (50 percent) or incinerated (50 percent) in a modern incineration plant. The latter method offers a long-term solution to land scarce Singapore.

Vector-borne Disease

Among the important infectious diseases in the country is malaria. This disease, transmitted by the *Aedes* mosquito was first reported in Singapore in 1960. It then became endemic with occasional outbreaks. Large epidemics occurred in 1966 to 1968 and in 1973.

The problem of malaria is really a disease closely associated with urbanization and development, and the creation of man-made breeding habitats in homes and construction sites. This is an area where education plays an important role in the control of the disease.

Food-borne Diseases

The presence of large numbers of hawkers (street vendors) selling food to the public poses a problem of maintaining food hygiene because these hawkers generally lack proper facilities for preparing and serving of food. They also lack proper disposal facilities for discarded wastes and this results in indiscriminate and unsatisfactory disposal onto roadways and into drains leading to littering and pollution of the water courses. The street hawkers also create traffic congestion especially in the city area.

In order to eliminate this problem, while recognizing that hawkers provide relatively inexpensive food, the government since 1971, has embarked on a programme to build "food centres" to house all street hawkers so that they could conduct their business in conditions conducive to good food and personal hygiene. These "food centres" are provided with water supply, lighting, electricity, wash areas, sewer connections, and anti-pollution features.

However, even with improved facilities, knowledge of food and personal hygiene may be inadequate. This is also true for those in other food establishments like restaurants, coffee shops, etc. Health education is therefore important for hawkers and other food handlers to gain knowledge of hygiene and to prevent serious outbreaks of food poisoning, viral hepatitis, typhoid or cholera.

ENVIRONMENTAL EDUCATION

School

Environmental education is not taught as a subject at the school level. However, subjects in the school curriculum include content related to the study of ecological and environmental education.

At primary 3 to 6 levels, emphasis is placed on the main theme "Man and his Environment" in the Science Curriculum.

At the upper secondary levels (Sec. 3 and 4), students can take the subject "Human and Social Biology" which includes relevant topics of environmental studies and population education.

The schools have been actively involved in the National Health Campaigns since they were first launched in 1968. Students take part in competitions such as slogan and poster designing, quizzes, debates, oratorical contests, and essay/song writing. Talks are given by guest-speakers, principals and teachers during assemblies and lesson periods in subjects like science, civics and education for living.

Science Camp

This is basically a field-based biology camp that is conducted twice a year (during the school vacations) for both pre-university students and selected teachers in training. It was first initiated in December 1978 by the Singapore Science Centre. Field studies of some ecological systems include the freshwater life in the stream and the pond, coral reef life, the mangrove habitat and other aspects of urban forestry, land and water resources utilization. The objective is primarily to create greater awareness and understanding about nature around us and the bio-social implications for Singapore.

Public Environmental Education

Public environmental education aims at informing the public of the environmental health problems and to educate the public on positive health measures that should be adopted to remove the problems or to minimize them.

These public education programmes are commonly carried out through massive campaigns but more recently by smaller scale education programmes on specific topics; e.g., anti-littering, water pollution, food-borne diseases, dengue haemorrhagic fever, proper disposal of refuse, etc.

To stimulate public awareness educational and publicity materials are produced and distributed to the public. Following the campaign, the exhibits are moved to several community centres throughout the island. The Ministry's officers deliver educational talks in schools and community centres.

Community action is instigated. Residents' Committees in housing estates are approached to follow up with community participation such as a "clean up" of the neighbourhood by the residents.

Mass campaigns usually involve the use of newspaper, radio and television to disseminate the educational message as widely as possible. The government-owned radio and television stations in Singapore cooperate and support the Ministry, by producing news documentaries, interviews, panel discussions and advertising slogans. The local press provides coverage on campaign activities and reports of Ministerial speeches relevant to the campaign themes. Editorials often voice support of public campaigns.

Environmental Training Courses

Two ministries in Singapore conduct environmental training courses. They are the Ministry of the Environment and the Ministry of Education.

As with primary and secondary levels, environmental studies are not taught as a special discipline. The National University of Singapore conducts compulsory or elective courses that are related to the environment. The contents of these courses include:

1) Environmental Management (Geography Department)
2) Physics of Environment (Architecture Department)
3) Environmental Engineering (Civil Engineering Department)
4) Pollution Control (Chemical Engineering Department)
5) Social Medicine and Public Health (Department of Medicine)
6) Environment Physiology (Zoology/Botany Department)
7) Population, Society and Urban Sociology (Sociology Department)
8) Environment Protection (Economics Department)

EDUCATIONAL DEVELOPMENT ON ENVIRONMENTAL ECOLOGY FOR SCHOOLS AND VOLUNTARY ASSOCIATIONS IN KOREA

by Dong Jun Kim*

Korea has recently made a considerable economic growth - notably since early 1960s - which has raised the per capita income to 1,636 US dollars in 1981. The future per capita income the nation is striving to achieve is 3,000 dollars by the year of 2000. Pollution, as an undesirable side effect of economic growth of a nation, is drastically accelerated due to a rapid industrialization and increasing economic activities.

As a result of the rapid industrial growth and the improved standards of living, problems on pollution have grown at a tremendously high rate. General sources of gaseous contaminants in the atmosphere are combustion of fuels and the handling as well as processing of chemicals. The most serious source of contamination in the urban air is automobile exhaust. The number of automobiles has increased remarkably recently in Korea as highway systems are improved and economic activities enhanced. The increased number of automobiles has contributed to increased air pollution; especially in Seoul where the levels have reached serious heights.

In the revised curriculum of elementary, middle and high school published by the Ministry of Education in 1973, the concept of environment was introduced.

Elementary School

Social Studies - natural environment and the characteristics of settlement in our community

Natural Science - food chain and mankind, equilibrium of the natural system, pollution and destruction of the natural system, preservation of the natural system

Physical Education - health with air, sunlight and water

Middle School

Social Studies - natural environment and characteristics of settlement, natural environment and national life by continent

Natural Science - living organisms and the environment, pollution and nature conservation

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Physical Education - environmental hygiene of air, light, water
and disposal

High School

Biology - Flow of energy and nutrients in ecological systems,
kinds of environmental pollution, preservation
of environment

In 1975, Korean Educational Development Institute tried out "The Curriculum Development for Population Education for the Students of Grade 1 through 12." This study included the basic principles of the ecological sphere, living organisms and environment, natural environment and human settlement, human activities and natural system in social studies science, physical education and home economics, related with the population education. This study will be referenced in the next revision of the curriculum of elementary, middle and high school in the 1980s.

In the college education we could also find the objective contents of environmental education in the curriculum; such as
"the Human and Nature" by Professor Hyo Chai Lee,
"Korean Sense of Nature" by Professor Yung Ho Lee, and
"Outline of Ecology" by Professor Bong Kyu Park
at Ewha Womans University.

Professor Hyo Chai Lee, Womans Resource Development Research Institute, Professor Yong No Lee, Korean Research Institute for Better Living, Professor Joon Hee Park, Human Development Research Institute of Ewha Womans University worked together on "The Development of Educational Program on Environmental Ecology for Schools and Voluntary Associations," under the financial support of the Commission for the Advancement of Christian Higher Education in Asia 1972 - 1974. Since this project was proposed by directors of three different research institutes at this University, as a joint interdisciplinary work, the process of carrying out the effort entailed serious cooperational efforts involving specialists from the disciplines of natural science, social science and education in and outside this University. It demonstrated to this academic community the possibility of an interdisciplinary approach to environmental education which in itself was of very comprehensive nature and involved many complex problems.

They published a series of eight introductory texts for environmental problems:

1. Man and Environment
2. What's Ecology?
3. Korean Plant Resources
4. Water Pollution and Citizen's Action
5. Air Pollution and Citizen's Action
6. Food Pollution
7. Urban Planning and Environment
8. Environmental Education

and produced the film "Environmental Contamination and Us." A project for developing educational aids and materials for ecology and environment was the first of its kind undertaken by an educational institution in Korea. Therefore, we consider this, in itself, a significant pioneering contribution to the society by a Christian university, particularly in view of the fact that Korea was facing growing problems of pollution under rapid urban-industrialization and that we saw an urgent need for drawing the national attention to the problems. This project aimed to make an impact upon urging the responsibility of the government, industries and citizens toward protecting and conserving the environment.

These texts and film eventually were shown and distributed widely among the leaders and members of governmental and non-governmental organizations as well as the teachers and students of secondary schools and colleges. These materials not only draw public attention to the phenomenon of polluted environment but also show possible ways of organized movement by citizen's groups in their local communities in preventing pollution and improving the quality of human environment.

The Committee of Religious Activities of Ewha Womans University held the religious emphasis with the theme "God, Nature and Human" in 1972. During the week of religious emphasis, the committee showed the students and faculties the slides and films about environment, and helped them to understand the importance of nature conservation as God's work.

Since 1966 the Korean Committee of Conservation of Nature established ecological studies near the Delimitation Military Zone (DMZ) with the cooperation of the Smithsonian Institution of U.S.A. The Committee has published leaflets about nature conservation with the financial support of the American Committee for International Wildlife Protection.

In 1970 the Saemaul (New Community) Movement was organized, in which all the civilians including the local residents and the factory workers have been cooperating for the improvement of rural and urban environments.

Since 1973 the Red Cross in Korea has been deeply concerned with the preservation of natural resources and has done much for environmental protection. About 25,000 members, volunteers and the Red Cross youths were united for the nationwide campaign under the name, "You and Your Environment, Priority for the Red Cross". They distributed educational posters and leaflets. The nationwide radio and television network has also propagated nature conservation.

Since 1975 the Korean Environmental Protection Institute composed of about 100 civilians such as entrepreneurs, intellectuals, medical doctors and journalists has conducted the campaign to expel "sooting vehicles" on the street and made a survey of 4000 residents' consciousness of pollution. The Institute has shown 834 slides of "Mankind and Environment" produced by the Nature Conservancy in U.S.A.

The environmental issues in a developing nation like Korea, which has shown an unusually high growth rate, should be taken very seriously by the leaders and citizens without further delay. While the general mood of the nation is for rapid economic development trying to catch up with the western standard, our environmental concern should put a brake upon such a simple zeal for rapid development, urging the leaders and people to reflect upon the necessity of development from the ecological perspective so that Korea should not repeat the mistakes that others have already made in the industrialization process.

ENVIRONMENTAL EDUCATION IN NEPAL: AN URGENT CHALLENGE

by Karna Sakya*

The Kingdom of Nepal is situated along the southern slopes of the Himalayas, bordering India in the south, east and west, and the autonomous region of Tibet in China in the north. This very small country of 54,362 square miles extends roughly 500 miles from east to west and 90 to 159 miles from north to south. More than 75% of the total land mass is occupied by mountain regions extending from east to west across the country. Topographically, the Kingdom of Nepal can be divided into four zones.

First, the Terai, lowlands close to the Indian border, forms the northern extension of the Gangetic plain and varies in width from less than sixteen to more than twenty miles. The altitude varies only from sea level to a couple of hundred feet. A few decades ago, this whole belt of the Terai consisted of vast, impenetrable tropical jungles, known as "char kos jhari," literally, "a continuous belt of eight mile forest along the country". This Terai belt was orginally a main source of the national income with its sale of timber to India from the fifties until the introduction of tourism in the mid-sixties. Now, most of this region's rich forests have disappeared and in their place, fertile agricultural land has been developed, although there are still a few pockets of Terai forest which are now struggling hard for their existence against tremendous human pressure.

Second, the inner Terai zone consists of a series of basins and valleys surrounded by the lower Churia hills in the south and the rugged Mahabharat range in the north. The altitude lies between 2,000 and 3,000 feet. The vegetation and faunal treasury is as rich as the Terai zone.

Third, the mid-mountain region, which is a labyrinth network of the Mahabharat mountain range, covers roughly fifty miles in width with an altitude varying from four thousand to fourteen thousand feet on the hill tops. The ridges and spurs of this middle land mountain area present steep slopes towards the south and relatively well-drained gentle slopes in the north. Within this zone are some great valleys such as Kathmandu and also the flat agricultural plains of the Pokharas.

Fourth, in the extreme northern region, the great Himalayan range displays its massive fangs from the east to the far west of the country. Within Nepalese territory are found thirteen of the world's highest peaks, including Mount Everest. Except for scattered settlements in high mountain valleys, most of the land mass in this area is of alpine desert above 14,000 feet. In the lower Himalayan foothills between

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8,000 and 14,000 feet, unique alpine types of vegetation are found. The vegetation in this region varies greatly because of micro-climatic factors.

Beyond the great Himalayan region, which according to the topography can be divided into a fifth zone, is found the trans-Himalayan region. Ecologically and evironmentally, as well as even culturally, this particular zone is the only zone in this country which has been able to maintain its heritage, because of its remoteness and inaccessibility.

This trans-Himalayan zone is rain-shadowed, since the monsoons cannot traverse the Himalayas. Hence, climatically, an alpine desert has developed. This region consists of remote areas such as Mustang, Manang, and Dolpo, most of which are still closed to foreigners. These regions are very close culturally and ecologically to Tibetan plateaux; much study in environmental ecology has been done here so far. However, the vast thick meadows, bushes and alpine scrub harbour the most beautiful wild flowers, and in this vast region live magnificent animals such as snow leopard, blue sheep, and thar.

Nepal has rich flora and fauna created by many different zoo-geographical and climatic regions. Especially in the Terai, every inch of land was formerly covered by thick forest. It was difficult for the sun to penetrate through the dense top canopy of the major forest systems "sal" and "terminalia" to the thick ground cover. Once, this "char kos jhari" was impenetrable not only because of a heavy density of vegetation and of the danger of encountering ferocious wild animals, but also because the door to this green world was shut tight by nature itself, guarded by malaria-infested mosquitoes.

After the fall of the Rana regime and with the dawn of democracy, the rays of development slowly radiated out of Kathmandu valley to the fertile lands of the Terai. Malaria was gradually eradicated, roads were built and then hill people flocked to the Terai with their guns and goats. The Terai was not affected by the hill migrants but was severely affected by illegal migrations from neighboring countries. Thus, the green belt of one of Nepal's most beautiful forests, which had throughout history been a hunting ground of the aristocracy and world celebrities, was invaded by biped animals, so-called "homo sapiens". Their tools, the axes, felled most magnificent "sal" trees, and their guns and arrows shot many wild animals to such a degree that some species even became extinct. Finally, innumerable cattle and goats carried on munching every available leaf of the natural forest vegetation.

As time went by, the quantum of ecological and conservation problems was magnified profusely without any consciousness of the general public or of policy makers and bureaucrats. The population boom in the country which not reaches 2.6% per annum not only created a most damaging aspect for nature in the Terai, but also extended as far as to the Himalayan foothills. As the number of hungry stomachs increased amongst both hill and Terai inhabitants, the people of Nepal forgot to live in harmony with nature. Beautiful hundreds-of-years-old climax forests were felled or burned down overnight. Huts and human dwellings were erected in their place.

Now this growing population problem has become a grass root cause of the ideological war between humanity and ecology. Many politicians, bureaucrats, and policy makers, even including practical conservationists, are confronted by difficult conservation issues. How can they ask poor villagers not to cut down trees to build their small huts? How can they ask them not to collect fuel wood to cook their rice? How can they ask them not to graze their cattle in the forest, when that is the only wealth that some people have? This melodramatic, humanitarian, and at the same time ecological conflict is one of the conservation syndromes now in Nepal.

At the moment, Nepal is relying completely on foreign aid. More than 75% of the five-year plan expenditures comes from foreign aid. Many economists believe that the burden of foreign loans and aid is distributed onto every shoulder of the Nepalese population, whereas the benefit of such funds is shared amongst a limited number of people. However, local government and international conservation agencies have woken up to visualize the horrible claws of ecological destruction and so are now giving reasonable priority to fighting these handicaps; operations such as afforestation schemes, check dams, soil erosion measures and the creation of national parks and wildlife reserves are being carried out. Some of them are quite successful including the fields of national parks and afforestation. But given the climax to destruction, what the government has achieved in the conservation side is minimal. The main reason for this sad problem is the lack of conservation education amongst the general public and bureaucrats. What is the use of making dams and spending millions of rupees if we cannot teach the local villagers in catchment areas the importance of tree conservation? Similarly, what is the use of planting hectares of land with trees if we cannot convince the villagers not to graze their cattle in plantation areas unless and until they are well-established?

And what is the use of soil erosion measures when whole massive hills are landsliding because of deforestation in the mountains? The grassroots of the problem lie therefore both in the local economy and in education. So, it is most urgent to realize that conservation measures cannot be carried out at gunpoint. For the longevity of nature conservation, it is necessary to harness the problem by educating the people by creating local economies, and at the same time by imposing legal restrictions.

Environmental Education Programmes

After the introduction of democracy into Nepal, education became accessible to the public and they slowly realized that by axeing trees they were axeing their own legs. Actually, the Department of Forest is one of the oldest bureaucratic bodies in the history of Nepalese administration, but they were instrumental only in the marketing and exporting of timber. At that time, timber export was a major source of Nepal's national income and the Department never realized the need to protect those mighty forests. Slowly the density of the forests was thinned and it was only in the mid-sixties that the Department of Forest realized the importance of the conservation of forests and animals. But they could concentrate their measures only in accessible Terai areas. Mountain forests were completely neglected and left to the villagers. There were no forest boundaries and villagers could till any available land in the mountains. Consequently, with the tremendous growth of population in the middle hills, even on the steepest land, one can still see rows and rows of terraces. Only in 1971 was the Department of National Parks and Wildlife set up; this office became very effective in conserving flora snd fauna within its adminsitrative regions because of tremendous interest shown by members of the Royal family.

While bureaucrats have recently realized the importance of conservation, a couple of years before some of the conservation-oriented public had realized it and had established the first nonprofit conservation organization named the Nepal Nature Conservation Society. The Society was incapable of tackling major conservation issues, but tried very hard to educate the general public by conducting audio-visual interpretation sessions and slide shows. The Society also produced newsletters and nature year books. The Society was never able to be vocal against some of the mistakes made by the government's forest and conservation policies. Nor did the government ever realize the importance of public participation in the field of conservation. The Society's major problem at present is the lack of funds and the lack of initiative on the part of members.

In government sectors, some other conservation agencies were formed such as the Department of Soil Erosion and Watershed Management, the Afforestation Office and Community Forestry. Most of these offices are action-oriented and tackle sectorial problems, but they give very little time and money to the field of environmental education in villages, although they sometimes put conservation slogans on radio programmes.

Ecological and environmental education is a new subject in Nepal. Most schools and colleges confine the curriculum to textbook studies, especially in applied science and social studies, and neglect field work. However, the present curricula of some schools and universities have added a few courses on nature conservation and wildlife.

A well-planned environmental education programme would be helpful to enable citizens of all ages and levels of our society to understand environmental interrelationships and principles. Such programmes will make people aware of our immediate environmental problems and in due course the programmes launched by the government will be well responded to by the public.

The most important state of environmental education in Nepal is the primary school stage. At the moment, more than 75% of our young children attend compulsory free primary school but when they have finished primary school, very few go on to secondary school, either because they have failed, or because they do not have enough money, or because they must help their parents work and do not have time. So it is vitally important to tackle the primary school age group, who will ultimately become Nepal's major population. Psychologically, it is true that if we can mould these young juveniles and impart to them a love of nature and animals, making them aware of our country's rich flora and fauns, our education will be more effective than convincing university students, who have already paved their paths of principles. So, for primary and secondary education, if we want to bring up nature-conscious students, we have first to teach the teachers.

However, at university level, a growing awareness of nature conservation amongst students and lecturers has formed a new curriculum in biological sciences. It now introduces a few quantum courses on nature conservation. Under the Department of Forest, the Institute of Forestry operates in the south of Kathmandu. The institute produces many undergraduate forestry students, but again the majority of the course concentrates on commercial forestry. The Institute of Forestry, which is under the auspices of the University, has introduced wider subjects of wildlife management and will very soon be opening a graduate level forestry institute at Pokhara. The green light to conservation environmental education has appeared but a relative effectiveness is still lacking. As has been already mentioned, unless and until we tackle primary and secondary school levels, our target of conservation education will not be maximized. Since the I.N.C.N. Commission has nominated a Commission Member in education in Nepal, the National Committee of the above agency has been created in Kathmandu with 20 active conservationists and educationists.

The Committee has formed certain sub-committees such as fund raising, publications, social activities, audio visual interpretation education, and treasury. The Committee is still working very hard with limited funds and has not yet been encouraged by the government or by international agencies, including its mother agency, I.U.C.N. headquarters in Switzerland. The main objective of the National Committee is to develop a consciousness of nature conservation amongst the Nepalese people much faster, more effectively, and more conveniently. So the primary objective is to teach teachers and policy makers about case studies of the alarming degredation of nature in the country. It is very difficult to canvass, with limited resources and manpower, an unlimited mass of illiterates and school children. Thus, the National Committee is organizing many slide shows, film programmes, and talks, inviting people to the Committee's office. Alternatively, representatives of the Committee visit various schools and colleges. Interpretation is not designed like college or school teaching, but rather is based on discussion so that the problems may be grasped more readily, by involving the participants directly in the discussion. The Committee raised its funds locally and part of that money is also used to entertain teachers and policy makers, giving them refreshments. Slowly, the Committee will take them to nearby fields to involve them in afforestation programmes so that they will be able to understand the environment much better.

To extend the objectives nationwide, the National Committee intends to set up Chapter Committees in the eastern, western, and central zones of Nepal. With the help of other conservation agencies in Nepal, the Committee has become very effective in broadcasting conservation programmes on radio.

Since the new phenomenon of the Committee is quite challenging, members are very active and enthusiastic, although they have to give a lot of their time and even their own finances. Within a very short time, the Committee has established very good public relations with the teachers of the major high schools of Kathmandu as well as of the colleges. Members of the Committee were concerned when they visited different schools and colleges and found out from their discussions that many teachers did not even know how many national parks the country had, and what were the objectives of the national parks and wildlife reserves. When teachers and educated people of society do not have the basic information of nature conservation, how can they understand crucial and complicated problems of environmental education? How could they ever convince their students of the alarming dangers to nature? The Committee has learned a good deal from experience that the most effective place for environmental education is amongst the body of teachers and policy makers.

The Committee would publish a lot of materials but it believes more in action of conservation rather than in wasting money or paper propaganda. However, the Committee felt the necessity of educating tourists who are now polluting in their own way, but rather in an ugly way. So the first publication by the Committee was a request to trekkers and porters - a series of "do's" and "don'ts" in English. The main objective of such a publication is to encourage tourism and to request tourists to enjoy the scenery and grandeur of Nepalese nature without destroying its quality.

The Committee has formed a bird watching club comprising many school and university students. The Committee encouraged young and enthusiastic members to help in sharing responsibilities for this worthwhile project. The students have shown tremendous enthusiasm and every Saturday a bird watching programme in nearby forests is organized. Tourists are welcome to joint the group by paying 80 cents which goes to the bird watching club. For Nepalese, the programme is free and it is the pleasure of the Committee to serve tea in the morning as an incentive. The present handicap is a lack of binoculars, which are expensive, but members' binoculars are shared amongst students.

With the help of foreign diplomats in Kathmandu, the Committee has managed to obtain a free hall for audio-visual interpretations, such as film, slides, etc. which are open to members and teachers.

The Committee has managed to get free accommodation in jungle lodges and resort hotels to award prizes in essay competitions which the Committee will launch very soon. Essay competitions are open strictly to bonafide primary and secondary school teachers The Committee believes that such prizes attract poor salaried teachers in open essay competitions, and they are forced to research themselves on the new ideas of nature conservation. This will teach them environmental education.

The Committee is arranging, with the collaboration of the Community Forestry and Afforestation Office in Kathmandu, programmes of planting trees by teachers of different schools during the coming monsoons. In this way, theoretical knowledge of environment and ecology will be reinforced by the practical action of planting trees.

The World Pheasant Association is very keen to set up a pheasant reserve in Western Nepal. The Committee suggested to the concerned body of the W.P.A. that without educating villagers about the need for the reserve, any work would be futile. So, some Committee members are going to the proposed pheasant areas to communicate with the villagers teaching them the importance of the reserve.

Since the authors have been involved in environmental education through nonprofit organizations for the last ten years, they realize that the present actions are not sure indications of the longevity of the Committee's objectives. This depends on finance and on response from associated government, private and international conservation agencies.

People who are committed to such societies are genuinely interested in the fields of the environment and ecology. Their interest is not driven or pressured by any responsibility. They are working only because they want to, and it concerns their integrity. Most of them are highly educated, understand the problems very well and realize the environmental ecological problems as well as the socio-economic situation of the country which makes them sensitive towards the practical approach, balancing nature against people's demands and the country's economic situation.

It is hoped that this message will be communicated to our bureaucrats and so-called conservation experts from different parts of the world working in Nepal, and to international conservation agencies. In the world of conservation, if we want quick, effective results, colorful charts, graphs, fact reports and a lot of paperwork are not enough. A bit of action with a touch of practicality is very important and vital.

MULTINATIONAL PROGRAMS

With the realization of the oneness of our earth and the initiative of Stockholm, Belgrade and Tbilisi and other intergovernmental conferences, our environmental view has broadened to be more global. Political boundaries have proved inadequate to define ecological systems. This understanding has brought with it more and more global education programs with a holistic, world perspective within countries and at the same time has encouraged cooperative efforts between nations on environmental research, management and education. The program, described in the Community Scale Section of this book, on environmental education for nomads is part of a Unesco initiative, Integrated Project on Arid Lands, research for the means to halt desertification. Other national or community programs in these case studies were initiated by or carried out with the assistance of the International Union for Conservation of Nature and Natural Resources (IUCN), the World Wildlife Fund (WWF) or other international organizations. The opening study for this book described the UN's progress in environmental education since Tbilisi. The case studies in this section are examples of cooperative endeavors between nations or programs of international organizations which involve more than one country.

The first study by Anton Trant provides a description of an innovative, cooperative effort of schools within countries of the European Community. Both the individual school programs portrayed and the infrastructure of the project serve as excellent models of environmental education and organizational structure. The study also has a section encapsulating the aims of environmental education, reasons for undertaking environmental education projects, the disciplines utilizing environmental education and methodologies. During the first year of the program, the local environment is examined. The wider environment, human relationships, urbanization and environmental action take the stage during the second year. The third year focus is on a broader European environmental issue. This evolution from national to broad focus and the cooperative aspect meet the Tbilisi prescription.

The two studies provided by Mark Boulton of the WWF attempt to reach the general public and school children, in Africa and other regions, through multi-media presentations. The first study describes developing a media program for the African bush. A comparatively inexpensive mobile unit was improved by making it more interactive and locally relevant. Sylvia Yorath's study gives the logistics of providing audiovisuals to an international audience, including the pros and cons of slides and filmstrips, the costs, and other factors of production. She highlights some programs the project has developed, usually in cooperation with and at the initiative of local environmental groups or experts in a field.

John Whitman's description of a privately-sponsored seminar on international environmental management closes this section. His program helps government officials of developing countries meet the challenge of environmental management. The program took place in the United States, included case studies of environmental management problems in the United

States, and covered a wide range of resource and human environmental concerns from agriculture and transportation, to environmental impact assessment and benefit/cost analysis.

The multinational programs, by crossing political boundaries and involving the cooperation of different nations are a step toward the international solidarity called for by the Tbilisi resolutions. The programs themselves furnish samples of education endeavors that can be used as models on the local to multinational levels.

THE EUROPEAN COMMUNITY ENVIRONMENTAL EDUCATION NETWORK 1977-1981

by Anton Trant*

European Community Action Programme

The European Community has an action programme for the environment. This programme was first adopted in 1973, and later extended in 1976. It is concerned with practical and important issues, such as the reduction of pollution, the rational use of space and natural resources, measures to protect and improve the environment, and cooperation with nonmember countries and international organizations. Towards the end of the programme there is a chapter entitled 'Promotion of Public Awareness of Environmental Problems and Education', and included in this chapter is a statement which says that the Community will undertake to develop a network of pilot schools for the exchange of information and experience in environmental education (Commission of the European Communities, 1976a). This network was duly established in 1977.

The Network Idea

The Network was sponsored by the Environment and Consumer Protection Service of the Commission of the European Communities. Before establishing the Network, a feasibility study was undertaken of current schools of the member states of the European Community (Commission of the European Communities 1978). Finally, after several discussions between officials from the Commission and from the Ministries of Education of the member states, it is agreed at a meeting in Brussels in February 1977 that the network could begin.

The principal aims of the Network were:

--to enhance the quality of environmental education in the pilot schools, through mutual cooperation and learning from each other's experience

--to collect, test and disseminate environmental education materials.

The first aim implied that the pilot schools had already acquired some worthwhile experience in the area of environmental education and that they were willing to share this experience with other schools in the Network. The second aim implied that the exchange of ideas and experience between schools would be accompanied by an exchange and development of learning materials. The development of these materials, which included audio-visual and printed matter, was envisaged as a dynamic process involving the active participation of all members of the Network.

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In the development of the Network it was envisaged that the term 'environmental education' would be interpreted broadly as taking into account urban as well as rural situations and involving disciplines of both the social and natural sciences.

The Structure of the Network

The pilot schools were selected by the national ministries for education and the following criteria were used in the selection process. The schools catered for pupils in the age range 9-11 years (later extended upwards in some countries to 14 years, and downwards in others to 4 years). The teachers in the schools were committed to the promotion of environmental education and were willing to experiment with new teaching and learning approaches in cooperation with schools from other countries.

On the basis of these criteria eleven schools and two environmental education centres, representing the nine member states of the Community, were nominated by their respective ministries between February and June in 1977. During the following four years, the number of pilot schools was increased to a total of twenty-nine.

The responsibility of coordinating the activities of the Network was entrusted by the Commission to the Curriculum Development Unit, Dublin. The Curriculum Development Unit was established in 1972 by the City of Dublin Vocational Education Committee (CDVEC) and is managed jointly by the CDVEC, Trinity College, Dublin and the Irish Department for Education. The Coordinating Team kept in contact with all members of the Network and facilitated the inter-communication which was necessary for the dynamic development of the project. The activities of the Team included visiting the pilot schools regularly, organizing meetings, exchange visits and seminars, and producing learning materials, newsletters and reports.

An advisory committee, composed of officials from the Commission of the European Communities, representatives from the member states (national experts) and members of the Coordinating Team, was responsible for overseeing the progress of the Network and advising on all policy matters. The national experts also played a vital role in their own countries in supporting the activities of the pilot schools.

The Joint Study Programme

At the first General Seminar, held for teachers of the Network in Dublin 1977, one of the recommendations adopted was that the schools would undertake a joint study programme and the results of this would be compared at a general seminar at the end of each school year (Curriculum Development Unit, 1977a,b). This joint study programme was operated by the schools over four years and was a major activity of the Network.

The Local Area

During the first year of the programme, 1977-78, each school undertook a study of some aspect of its local area. Some schools chose to explore their local area on topographical lines - for example, a rural school looked at the quarries and caves of the surrounding countryside, and the pupils of an urban school studied the layout of their city. Two schools studied the livelihood of the inhabitants of their local areas - in one case, tourism and in the other, fishing. A number of schools took broad themes such as "food", "shelter", "the weather", "earth", "air". "water", and related these themes to their own situation. Finally, three schools chose to study topical issues - the use of a public park, the construction of a dam and a plague of insects on a local river.

The results of the first year's work were displayed at the Network's second General Seminar held in Hertfordshire, United Kingdom in July 1978 (Curriculum Development Unit, 1979e). Based on the presentations of the various projects a general report was compiled and afterwards published in English, French and Italian. This publication was called Life and Environment and in it can be found detailed descriptions of what the schools achieved during the first year. (Curriculum Development Unit, 1979f, 1980f).

The Wider Environment

During the second year of the Network's existence, 1978-79, the joint study programme was extended from the local area to the wider environment, and the topics covered by the pilot schools could be broadly classified under six headings: use and abuse of the natural environment; human pressures on the natural environment; human relationships in modern society; the effect of urbanization; environmental action; and contrasts in the environment.

A common format for reporting on the work done was adopted by all the pilot schools. This format comprised: (i) project theme; (ii) objectives;(iii) subject areas involved; (iv) number and ages of the pupils; (v) duration of the project and the number of hours per week spent on it; (vi) a step-by-step description of the course of the project; (vii) the teacher's review of the project in relation to the original objectives.

Presentations based on the second year's work were made by the teachers at the Network's third General Seminar held in Rovereto, Italy in July 1979 (CDU, 1979b, 1979c, 1979d, 1979e). A record of this work was afterwards published in English and in French by the Coordinating Team under the title Profiles of School Projects 1978/79 (CDU, 1980c, 1980d).

European Environmental Issues

During 1979/80, the third year of the Network's existence, the joint study programme was devoted to European environmental issues. The Network was divided into three working groups and each group selected one of the environmental issues referred to in The European Community's Environmental Policy, a brochure published by the Commission of the European Communities (1976b).

Mid-year seminars were arranged for each of the three groups. The purpose of these seminars was to provide the groups with a forum for comparing and compiling their work, with a view to establishing a format for their final products (Curriculum Development Unit, 1978c).

All three groups met together at a General Seminar in Luxembourg at the end of the year. During this general seminar, the groups made presentations of their year's work and also drew up plans for the following year (CDU, 1980e).

The first group (Group A) was French/English-speaking and represented schools from Belgium, Federal Republic of Germany, France, Ireland and Luxembourg. The members of this group based their year's work on the issue "Man-made Environment: Cultural Heritage". By the end of the year the group had produced a booklet based on an experiment carried out in one of the schools represented in the group. The booklet was published in French and English, and was entitled Restoration of a Playground: Report of an Experiment carried out at the Ecole Communale de Han-sur-lesse, (CDU, 1980a, 1980b).

The subject-matter of the booklet was important only insofar as it illustrated a particular approach to environmental education which could be applied to other situations in urban or rural settings. In order to highlight this, the group concentrated on an analysis of the objectives set, rather than on a chronological account of events and activities.

The second group (Group B) was Italian/English-speaking and consisted of schools from Ireland, Italy and the United Kingdom. The members of the group chose the issue "Recreation and the Environment" and by the end of the year had produced a teacher's manual in English and Italian, based on the following objectives: to make the children aware of how much free time is available to them; to examine the ways in which children, adults and old people use their free time; to make the children aware of recreational possibilities in their own environment and to assess the adequacy of these; and to discover suitable interests in the environment by introducing the children to a wide range of activities (cultural, aesthetic, social and physical) (CDU, 1981h, 1981i).

The third group (Group C) was German/English-speaking and consisted of schools from Denmark, Federal Republic of Germany, Luxembourg, the Netherlands and the United Kingdom. The members of the group chose the issue "Energy Production and Conservation" and by the end of the year had produced a teacher's manual in English in the form of a loose-leaf folder, with the following twofold purpose: to be a source of ideas, methods and procedures for other teachers working on the energy theme, not in a prescriptive or definitive way, but as a pedagogical aid; and to increase teachers' and pupils' awareness of the energy crisis and to develop positive and constructive attitudes towards the use, misuse and conservation of energy.

One of the interesting features of the loose-leaf folder on energy was that it spanned the age groups from 4 to 14 years, suggesting ways in which a primary teacher who had no formal scientific training could deal with the kind of topics contained in the energy theme (CDU, 1982).

Teaching Methodologies and Environmental Education

It was decided at the Luxembourg General Seminar, July 1980, to retain the group structure established the previous year. The joint study programme had now widened into "Teaching Methodologies and Environmental Education."

The members of Group A chose a variety of themes for the school year 1980-81. These themes were "The Use of the Environmental Centre at Han-sur-lesse," "Study of a Pond in an Amenity Area," "Improvement of the School Grounds," "The Development and Use of a Cultural Centre by Pupils," "Creation of a Nature Trail," and "Study of a Valley." Each school in the group worked on its own theme according to a common approach established by the group - "observe, understand and act". A report on the group's work, including an analysis of objectives and methods, was presented at a mid-year seminar in February 1981, and a group product based on this approach was prepared by the end of the school year. This document was published in French and English and was entitled Environmental Actions (CDU, 1981b, 1981c).

Group B selected a group theme, "Man's Impact on the Environment" with each school working on a particular sub-theme. Examples of these sub-themes were "Urbanization", "Pollution and Conservation", and "Transport." The English-speaking members of the group met in Hitchin, United Kingdom and Italian-speaking members in Rome during October 1980. At these two meetings, final selections of sub-themes and plans for the group product were made. At a mid-year seminar in Pozzallo, Sicily, in April 1981, the content and format of the group product were agreed upon. This product, which was intended for teacher's use, dealt with various aspects of the main theme, such as change, adaptation, use and abuse of the environment, conservation and the interrelationships between man and his environment. By the end of the school year, it was published in English and Italian and entitled Man's Impact on the Environment. (CDU, 1981d, 1981e).

Group C chose the theme "Water" and the member schools selected sub-themes from a list drawn up at the Luxembourg General Seminar. At a group meeting held in Neumunster, Federal Republic of Germany, at the end of October 1980, each school decided to undertake a particular case study based on an environmental concept. Examples of the concepts and case studies selected were "Use and Abuse of Water," with a case study on Food and Food Production in the Sea; "Protection of an Unique Water Landscape" with a case study on the Wetlands of West Jutland; and "Pollution in Running Water" with a case study on the Middle Rhine. At a mid-year seminar in March 1981, final decisions on the group product were made and a draft of the product compiled. The final product, a teacher's manual on "Water," was published in English at the end of the school year (CDU, 1981j).

Evaluation

An evaluation seminar took place in Luxembourg on 21 and 22 May 1979. It was attended by representatives of the Commission of the European Communities, representatives from the nine member states of the Community, and members of the Coordinating Team. The two principal aims of the seminar were (a) to evaluate the progress of the Network to date and (b) to make plans for future development. Copies of a document, prepared by the Coordinating Team, which analyzed the views of the representatives of the member states, as expressed in questionnaires returned by then, were circulated (CDU, 1979a). The analysis indicated that the operation and progress of the Network to date had been satisfactory. However, it was also felt that the time had come for a greater concentration on the dissemination of information on the Network and on the production and dissemination of environmental education materials produced by the Network schools (Commission of the European Communities, 1979).

During 1980-81, the last year of the Network, it was felt that a more formal analysis of the projects should be carried out. An analysis questionnaire was written by the Coordinating Team in the autumn of 1980. The questionnaire was then presented to a meeting of the national experts in Brussels on 15 January 1981, and was formally adopted.

The replies to the questionnaire were analyzed by the Coordinating Team and formed the basis of a synthesis of all the Network's projects in the four years of its existence (CDU, 1981a). This synthesis document, which was presented at the Network's fourth General Seminar in Paris, July 1981, contained a number of conclusions very similar to the guidelines issued by the UNESCO Conference at Tbilisi in 1977 (UNESCO, 1978). The following are some of the major conclusions:

Aims of Environmental Education:

The aims of environmental education involved the development of knowledge, skills, attitudes and values. As such, they fell within the aims of general education but added a specific environmental dimension. This environmental dimension - the interrelation between man, culture and the biophysical surroundings - suggested three aspects which could form part of any comprehensive programme in environmental education:

(i) Learning about the environment, i.e. knowledge, concept and skill objectives

(ii) Learning for the environment, i.e. attitudinal and value objectives

(iii) Decision-making and action based on the acquisition of these earlier objectives.

Reasons for undertaking Environmental Education Projects:

Environmental education projects were undertaken because of their local nature, or because they were of a topical or controversial nature. The local area of the school was the main focus for the environmental education projects. This created an immediacy and relevance for the children. In some schools the local area; or some aspect of it, was the entire subject of the project; in other schools, it served as an immediate example in a study of a wider topic, or global issue.

Disciplines underlying Environmental Education:

Environmental education involved both the social and natural sciences and, as such, was normally interdisciplinary. Some school programmes included studies which were unidisciplinary or multidisciplinary. However, the main emphasis throughout the Network was on the interdisciplinarity of environmental education.

The major disciplines in the environmental education projects were: science (especially biology), history and geography. There was a tendency for science-based projects to be used with older children and for geography- and history-based projects to be used with younger children. Vernacular language, mathematics, arts, craft, drama and music all contributed to the projects in all cases. Fieldwork was regarded as an essential component in environmental education.

Methodologies:

The methodologies followed depended on the aims and themes of the various projects. However, it was possible to distinguish four different types: (i) historical/geographical method; (ii) investigative/experimental method; (iii) survey method; (iv) problem-solving method. All the projects had a variety of activities, took place in and out of school, and involved various groupings of pupils. All the activities, however, could be summarized in three stages: observation, understanding and action. The most common ways of presenting the results of the projects were through school exhibitions, pupil workbooks and the completion of a practical task.

Inservice Seminars for Teachers

Four inservice seminars for Network teachers took place. The first seminar was held in the Ecole Normale Mixte de Foix in France in March/April 1978. The purpose of the seminar was to introduce teachers to the practice in France of taking classes into the out-of-doors - "les classes de nature" (CDU, 1978b).

The second seminar was hosted by the Institut für die Pädagogik der Naturwissenschaften (IPN), Kiel, Federal Republic of Germany in November 1978. The principal aim of this seminar was to inform Network teachers about recent developments in environmental education and to provide them with the opportunity of seeing materials and documents which would be of use to them in their own work (CDU, 1978a).

The third seminar was held at Centre Permanent d'Initiation a l'Environnement des Hautes-Pyrenees, Argeles-Gazost, France during April 1979. This seminar was organized to provide Network teachers with the opportunity of exploring and developing teaching methods and pupil activities for field trips in both natural and man-made environments (CDU, 1979g).

The final inservice seminar was held in the Teacher's Resource Centre, Aberdeen, Scotland, United Kingdom, from 29 April to 4 May 1979. The aim of this seminar was the production of environmental education materials - on the theme "Urbanization" - which would be of use to teachers from the various countries in the Network. These materials were afterwards published in book form under the title of Our Changing Locality (Grampian Regional Education Committee, 1980).

Continuity of the Network

July 1981, the three working groups made final presentations of their group products (CDU. 1981g). On the eve of the Seminar, the Network Advisory Committee met and made two important decisions. First, it was agreed that the Network would have a supplementary year to consolidate the various initiatives at national, regional or local levels, and to establish a regular pattern of communication at European level. Second, it was also agreed that the Network idea should not be allowed to die, and to this end a secondary phase should be developed catering to pupils from an older age group. Furthermore, both phases of the Network, primary and secondary, were to be linked together through the activities of the Coordinating Team (CDU, 1981f).

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CONSERVATION ON WHEELS

by Mark Boulton (United Kingdom)*

The concept of Mobile Information Units is not new. For many years, vehicles equipped with film projection equipment have visited outlying towns and villages in many developing countries, operating under Government Ministries of Information or Agriculture. The use of specially fitted vehicles to increase public awareness in the field of conservation is not new either, but the Mobile Education Units designed and produced by the World Wildlife Fund/International Union for the Conservation of Nature and National Resources (WWF/IUCN) International Educational Project do show many interesting variations on the basic theme.

Traditionally, Government-run Information Units have consisted of four-wheel drive vehicles, usually Land-Rovers, equipped with 16mm film projectors powered by electricity derived from a generator driven by the Land-Rover's engine. Such vehicles are expensive to purchase and in these days of climbing oil prices, even more costly to run and maintain. A careful study of the requirements for a Mobile Conservation Education unit suggested that such expensive vehicles were often unnecessary, and that the equipment was not always the most apropriate for conservation purposes.

The prototype 'Mini-Mobile Unit' was built in 1976 in response to a request from the Parcs des Nationaux in Senegal for assistance with their public awareness programme. After careful consideration, the Renault Fourgonette van was selected as the basic vehicle. It was readily available, relatively low in cost, adequate in size, extremely economical in use, well proven in the field and above all, easily modified to take the specialized communication equipment.

Like most other information vehicles, the Renault van was equipped with a 16mm film projector, the model being carefully selected on the bases of proven hard work in 'bush' conditions and ease of servicing. Unlike its more expensive counterparts, the projector was powered by a small, economical and very quiet petrol generator of the type frequently used to supply current for two-way radio systems. Consuming less than half a litre per hour and readily carried by one person, this generator has performed extremely reliably over several years of regular use.

Unfortunately the availability of 16mm films on conservation subjects especially relevant to local conditions is somewhat limited and the designers opted for additional projection equipment designed to use standard 35mm slides. Automatic slide-tape equipment is now widely available, but in 1976 a special unit, aptly named the 'Pandamatic,' was designed and constructed especially for this purpose. The equipment included a durable casette deck, a powerful amplifier, and the rugged Kodak Carousel Projector. All this was fitted into a specially prepared case. Protection from shock and adverse climatic conditions was felt to be of major importance, and cases were made of rigidised aluminium, lined with foam; such cases were eventually used for all the electronics, projection, cameras and recording equipment.

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A simple projection stand, a roof-mounted speaker and a roof-mounted screen completed the outfit. Later two roof-mounted rigid screens were provided to allow for the display of photos, posters, and other visual materials.

During the development of this first prototype, a similar request was received from The Gambia in West Africa. So a second vehicle, basically very similar but with the added facility of an internal rear projection screen, was constructed at short notice. Both vehicles were shipped to Dakar and a week's basic instruction was given to the respective operators. 'Volunteer' staff from the U.S. Peace Corps and the British Voluntary Service Overseas were appointed as Training Officers and each was supplied with a local counterpart.

During the course of the next two years, close liaison was maintained between the designers and the operators, and this revealed a number of ways in which future units might be improved. In both instances 16mm films were difficult to obtain or carried sound tracks which were inappropriate in content or language, frequently both. Thus the provision of a 16mm projector with magnetic recording and playback facilities would open up the possibility for new commentaries to be added to the films. These recordings could be made at the right levels of understanding and with an emphasis on local problems and they could, of course, be prepared in vernacular languages. Secondly, it was felt that the existing units were equipped only to disseminate information. The provision of suitable camera and tape-recording equipment would allow for the possibility of taking photos and collecting sound recordings which could form the basis of preparing new programmes. Thirdly, experience suggested that a public address system operating from the 12-volt vehicle battery could considerably increase the scope of the work. Finally, the day-to-day running of the unit produced a spate of minor irritations. Subsequent vehicles supplied to Cameroon (1979), Rwanda (1980), Uganda (1981) and Sri Lanka (1981) showed a trend of continuing minor improvements. Standard equipment now normally includes a 16mm projector with magnetic record/replay facility, a 12-volt PA system, a portable tape recorder and 35mm camera equipment, SLR automatic camera with standard lens, zoom lens and flash. The projector stand was further improved and extension cables were supplied on 'easy reel' drums. Service manuals, spare parts, basic tool kit, petrol cans, and inspection lamps are also included.

Two other areas requiring vital attention have also become evident. The first is the frequent lack of really relevant communication materials - films, slide-tape packs, posters, and reading material. So for Rwanda the Mountain Gorilla Project (which operates the vehicle) and the WWF/IUCN International Education Project worked together on a slide-tape programme dealing with the threats to the Mountain Gorilla and their implications for people Versions were prepared in both French and Kinyrwandan, the latter being narrated by Rwandan newsreader. The response to this presentation, and a 16mm film about the gorillas, has been dramatic. Audiences of more than 3000 people have been a regular occurrence, causing new problems related to picture size and narration volume. Extension bars have been provided to increase the height of the screen and ways of amplifying sound levels further are being investigated.

A second and even more urgent requirement is perhaps self-evident. The full potential of such a unit can only be realized by a trained operator. Attempts are now being made to integrate a training aspect into any project proposal seeking to acquire such a unit. This may take the form of briefing and supervised use in the field situation immediately after delivery of the vehicle, or of a specially arranged residential training course. Certainly there is little point in supplying such sophisticated equipment without also providing the 'know-how' to make the best use of it.

The latest 'deviation' from the basic theme has been the development of an audiovisual trailer unit which can be towed behind a Land Rover. This came into being to resolve the difficulties which would have been encountered had a plan to use the same Land Rover for both anti-poaching and information work been adopted. The provision of a trailer means the projection and electronic equipment will not need to be removed from the vehicle whilst it is in its 'anti-poaching' mode. The AV trailer can be towed to the desired location point, and operated in the absence of the vehicle which can take it on to its destination as and when it proves convenient.

Is this a wise and effective use of limited funds and resouces in the battle to raise the level of public awareness to conservation and environmental issues? Only time will tell, but already there are some encouraging indications.

A CASE STUDY ACCOUNT OF THE DEVELOPMENT OF AUDIOVISUAL MATERIALS IN CONSERVATION

by Sylvia Yorath and Mark Boulton (United Kingdom)*

WWF/IUCN's International Education Project was initiated in 1975 to promote practical conservation education programmes in developing countries. Working under the umbrella of WWF International and the International Union for Conservation of Nature and Natural Resources, it has supported educational programmes in more than 50 countries. Based on work previously carried out by the project coordinator in East Africa, and later in Zambia and Nepal, the project has maintained a practical "grass roots" approach concentrating on the production and use of educational materials.

Although it has prepared a wide range of such materials including wall charts, posters and conservation books for schools, particular emphasis has been placed on the origination and production of audiovisual materials. Since preliminary investigations indicated that filmstrip and slide projectors were very widely available, even in many less-developed countries, the project has concentrated on the preparation of filmstrips and slide packs covering a wide variety of conservation subjects. In the account which follows, Sylvia Yorath, the project's AV technical officer, describes some of the practical aspects of this work.

The concept of producing AV materials grew out of an increasing awareness of the need to communicate the conservation message to as many people as possible. Since the brief of the project was to assist environmental education programmes in the developing parts of the world, it was felt that filmstrips and slides were particularly appropriate, offering several advantages over 16mm film. They are cheaper to produce and distribute, extremely flexible in use, and more readily updated/adapted than 'movie' film.

The programmes are prepared in two main forms: as filmstrips and as slide packs. The former are cheaper to produce and mail and can, of course, be cut and mounted into ordinary slide mounts if the user wishes Filmstrips are supplied in tough plastic cans which give full protection but are light in weight. Slides are distributed in plastic wallets providing a convenient method of display, protection, and storage and which also contain a pocket for the script and other printed materials. Though frames are usually placed in numbered mounts overprinted with the programme title, they can be supplied in glass-protected mounts which minimize damage and eliminate focusing problems. They are, however, rather vulnerable to rough handling in the post.

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All programmes are accompanied by a printed text and each paragraph normally carries a black and white picture of the relevant slide. This not only facilitates accurate "matching" of words and pictures by the operator. but also provides an attractive illustrated leaflet which can be used for education, information or promotional purposes in its own right. Programmes are usually originated in English, though some are actually prepared in "local" languages and translated into English afterwards. A number are now available in French, Spanish and a few other languages. Many of the programmes have the script recorded onto international compact cassettes which may also carry sound effects and music. They also carry inaudible "control" pulses enabling the programmes to operate automatically on appropriate slide-tape equipment. If this is not available, the operator uses an ordinary slide projector and cassette recorder, the slides being changed manually in accordance with the information in the illustrated script.

Since no appropriate slide-tape equipment suitable for field conditions overseas was available when the project started. it designed and built its own unit, the "Pandamatic" in 1977. This comprises an AV cassette recorder, an amplifier, and a public address system incorporated into a durable aluminum case which also houses a Kodak Carousel projector. Various models of the "Pandamatic" have now been supplied to projects in a number of countries. A year later the equipment was included in a mobile education unit for conservation work in Senegal, West Africa. Based on the well-proven and economic Renault Fourgon van, fully-equipped units are now operating in seven countries, mainly in Africa.

Though all the early AV presentations were prepared for very specific target groups in particular countries, it soon became evident that such programmes were valuable resource materials for schools and colleges, as well as for those involved in nature resource training programmes. A simple catalogue was therefore put together and programmes were brought to the attention of a wider audience. Prices were deliberately kept at a modest level in order to encourage the greatest possible utilization of the materials, and any "profit" generated was recycled to allow for the production of new programmes, or to subsidize materials supplied to the developing countries.

The cost of a new production is dependent on many factors and can range from a hundred to several thousand dollars. The source of original slides for the programme is very important. The purpose of reproduction rights from commercial photo agencies can be very expensive, so the project has often managed to persuade individuals to loan 35mm slides for programme production. In many cases of course, the initiators of new presentations provided or located the slides themselves and this clearly reduces costs. In addition, a photo library of resource slides is being built up for the future. Rarely do funds allow for any specific location photography in the field.

The length of the programme also has a considerable bearing on the cost. Some have as few as 20 slides, whilst the most sophisticated "twin projector" presentations have more than 150 and are significantly more

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expensive to operate. The cost of production copies is very dependent on the number required and costs drop dramatically with large "runs." The number of graphics and special effects also affect costs. Most programs carry a title and an end credit but some require a number of graphics, maps or other data and the more complex presentations may also require slides to be shot "in register" for special effects. Illustrated scripts are more expensive to prepare than simple written texts but are felt to be a valuable asset if the budget allows. Costs are increased if the programme involves a prerecorded cassette and the "audio" costs themselves depend on such factors as the charge for the recording studio, the fee of the narrator, and the "mix" of music and sound effects if these are required.

More than 60 AV presentations have now been completed on an extensive range of topics. They vary from general conservation issues such as "Why Conserve Wildlife?", "Man and Nature" to very specific programmes on individual endangered species. Some deal with the conservation of wildlife in particular countries, Britain, Indonesia, India or Malaysia whilst others are concerned with threatened habitats. A great many presentations are the result of very close cooperation between WWF/IUCN International Education Project and other conservation organizations or special interest groups.

"Desertification, its causes and some solutions" was prepared jointly with the Desertification and AV Units of the United Nations Environment Programme (UNEP) in Nairobi, Kenya.

"Multiply the Message" tells the story of cooperation between the World Wildlife Fund and the World Scout Movement and looks at ways in which scouts throughout the world have become actively involved in helping to solve conservation problems. "Gambia and its Future" is an example of two leading international organizations--the World Wildlife Fund and the International Planned Parenthood Federation (IPPF) working together on subjects of common interest, such as population and resources. Placed in a country of particular concern to both organizations the programme was developed in close association with local groups in The Gambia.

A number of presentations highlighting marine conservation have been prepared in conjunction with the Underwater Conservation Society (UK). They include "Interrelationships in Marine Life," "Coral Reef Life in the Red Sea," and "The Underwater Conservation Code."

The training of the education officer of the Kenya Wildlife Clubs subsequently resulted in the production of four AVs particularly relevant to Kenya and its special conservation interests and problems. The trainee was responsible for drafting the scripts and played a major part in the production process. "Wildfowl in Trust" was prepared in cooperation with the Education Department of the Wildfowl Trust, and "Focus on Otters" came into being to highlight the threats to the European Otter and the work being carried out to give it protection by the Joint Otter Group and the Royal Society for Nature Conservation. In both these cases the scripts were drafted by the respective organizations and then brought to the project for development and production.

Several AVs have been written and photographed by acknowledged experts in their various fields. "Focus on Badgers"--one of a series of programmes on British wildlife was initiated by Dr. Ernest Neal, and Dr. Andrew Laurie wrote "The Greater One-Horned Rhinoceros" after three years' work in Nepal. "Turtles in Danger" was primarily the work of Dr. Peter Pritchard of the IUCN Species Survival Commission's turtle group and the "Asian Elephant" was written by Dr. Rob Olivier of the Elephant Specialist Group.

Some programmes have been prepared to focus attention on major campaigns and to help raise funds for important conservation issues. "The Seas Must Live" was shown at the launch of WWF's marine campaign in San Francisco and "Run for your Life, Rhino" was prepared to indicate the plight of the world's rhino species and the efforts to protect them.

Much work has been done in collaboration with WWF National Organizations--especially in Malaysia and India. In the former, programmes emphasizing the threats to the rainforest ("The Great Jungle Bungle") and to the giant leathery turtle have been prepared for schools, whilst presentations made in collaboration with WWF India have included subjects as wide ranging as "The Face of Famine," "The World of Snakes," "The Lord of the Jungle," and "Vanishing Forests." A series of 11 programmes were prepared to support educational work in Indonesia and this material would be of great value to anyone making a serious study of this part of the world. After being approached by the London-based Fauna and Flora Preservation Society (FFPS) the project cooperated with a number of other groups under the umbrella of the "Mountain Gorilla Project" to prepare a slide-tape programme dealing with threats to the endangered mountain gorilla and the implications for people of the causes of its decline. Versions were prepared in the local Kingrwandan language as well as French and English and copies were supplied to every school in Rwanda with audiovisual facilities.

Some programmes have had fund-raising functions, too. "The Elephant Song" and "Save The Oceans of the World" originated as popular songs to which a series of slides were added and have raised a substantial sum for conservation. Commercial sponsors were involved with "Saving The Whale," which incidentally also resulted in a cessation of the use of whale products by a well-known international company, and "Penguins and Their World," which described the various penguin species alive today and the threats to the world's oceans in which they live.

Recent emphasis on the World Conservation Strategy has also been incorporated into a multi-media pack for use in British schools. "Help Save The World" introduces young people to the principles and objectives of the strategy and suggests how they can become actively involved. This comprehensive pack was funded by the United Nations Environment Programme and includes a colour poster, reading books, colouring sheets, a WCS newspaper and teacher's notes--as well as the slides and cassette, and packs were distributed free to about a hundred leading conservation groups, schools and individuals. Extra copies of the pack are still being sold at cost and are helping to raise the level of awareness about these vitally important conservation issues. Several other countries have already shown great interest in adapting the pack to suit their own particular problems, Belgium having already found a sponsor to distribute 6,000 sets to schools in that country.

Of course, the follow-up to any slide presentation is crucial. Whilst the programme may play a major role in awakening interest it is only a start, a foundation which must be built upon. Thus information supplied with many programmes indicates addresses where additional information can be obtained and activities that can be carried out to increase the involvement of the audience. With young people this frequently takes the form of competitions, essay writing or poster design, or debates or questionnaires. Only thus can the conservation message be consolidated in the hope that it will result not only in increased support, but in a change of behaviour or lifestyle too.

One of the greatest difficulties in conservation education work is to establish the effectiveness of different techniques and approaches. Does seeing an AV on a particular subject help? Well, certainly it may attract a large number of people as reports from Rwanda indicate. More than 3,000 people have been turning out to watch the slide presentation on the mountain gorilla and this has provided a unique opportunity to talk to large numbers of people about the importance of forest conservation. Similarly, correspondence from Uganda states that the sight of a poacher on the screen has become "an abomination" to the young Ugandan audiences! Clearly the potential for the use of the AV medium in conservation is great, but it will only be fully effective when nationals of the countries concerned are themselves involved in programme production and utilization, so future work will lay great stress on training. There is no doubt, however, that AV does have an important role to play and will continue to do so.

INTERNATIONAL SEMINAR ON PRINCIPLES OF ENVIRONMENTAL MANAGEMENT IN DEVELOPING COUNTRIES

by John R. Whitman (United States of America)*

A senior government official wrote, "The exchange of ideas among the participants was a very valuable experience. It was very interesting to see where other countries are in terms of environmental protection and to hear their attitudes toward solutions which are a function of their society and values.

A corporate executive with a multinational corporation wrote, "I have gained an insight into planning that will assist me in setting goals, objectives, and programs for the following years. This has not really been done before, and it is essential. The framework for such a planning effort crystallized in my mind during the seminar. Also a more international view was gained that puts the issues of my company into a larger perspective."

The seminar was the International Seminar on Principles of Environmental Management in Developing Countires, offered annually since 1979 by a for-profit environmental consulting company, Environmental Research Technology, Inc. (ERT), of Concord, Massachusetts, USA.

Background

ERT was founded in 1968 in anticipation of the potential business created by emerging environmental protection legislation in the United States. The concept behind the company was simple: Regulations would require industries and utilities to comply with environmental standards, and these industries and utilities would need specialized consultants to help them comply. Indeed, compliance would cost money, but the fines for non-compliance would cost more.

The company grew steadily over the next decade, a period of general economic hardship in the nation. ERT became known as the corporate leader in its field and the largest dedicated environmental consulting company in the country, with about 700 employees in some 14 offices and over $30,000,000 in annual sales.

By 1976, ERT had begun to undertake projects in Saudi Arabia. ERT International, Inc. was established as a subsidiary responsible for developing the international market for ERT.

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The Seminar

The plan was to organize an educational seminar targeted to government ministers and other top level policy makers and decision makers from developing countries around the world. The seminar, called Principles of Environmental Management in Developing Countries would introduce the participants to the key concepts, vocabulary, and techniques in environmental management in an integrated way that would strengthen their environmental protection skills and responsibilities in their respective countries. Most of the seminar would be conducted by senior scientific, technical. and policy experts on the staff of ERT. with selected topics being led by visiting faculty from organizations such as the World Bank and the United Nations Environment Program, and from universities including Purdue and Harvard.

The seminar, then, served a dual educational and marketing purpose. Corporate interests aside, the seminar would also become a welcome alternative and complement to the usually university-based environmental education and training programs for policy makers and practitioners from other countries, subsidized by government or international agencies. Furthermore, the seminar would become an open, non-polital forum, in which all interests, including those of the private sector, could be shared without influence, expressed or implied, of any official body.

Organization

A key consideration was determining the target group. It was obvious that policy makers and decision makers at the national level were the prime audience. They were making the decisions that had substantial environmental implications, and they also were the likely clients for ERT's services. However, it was felt that others should be invited as well, including project officers from international financial institutions, representatives from international agencies and organizations, and executives from multinational corporations with operations in developing countries.

With such a high level target audience, another consideration was how much time participants could spend away from their offices. A course of less than one week would be of little educational value and might not justify the expense of travel to the United States. A course longer than two weeks might be too long to justify absence from a demanding office. A two-week program was considered optimal, especially if it immediately preceeded or followed the annual conference of the Air Pollution Control Association, which was commanding increasing international interest. This would give participants the option to attend both on the same trip. Furthermore, the seminar's timing in early summer, offered the added attraction of combining the seminar with a brief vacation during the most beautiful time to visit the New England area.

The seminar was aimed toward developing countries, which posed a problem with respect to setting a tuition fee that would be large enough to recover development costs, but not so high as to be beyond the affordable reach of participants. No such amount was found. Instead a scholarship program was developed, such that participants from the relatively wealthier countries would, through full payment of a $2,500 tuition fee, subsidize the participation of members from countries less able to pay. Once a certain number of fully paying participants had registered, full or partial scholarships would be issued to applicants in need of financial assistance who otherwise could pay all costs except the full tuition fee. An alternative would have been to seek full or partial subsidy for the program by an outside organization, but this would have meant diluting control of the seminar. Applicants with need for financial assistance were also encouraged to seek sponsorship from aid organizations directly.

Mr. Whitman established the International Environmental Management Institute as the professional educational component with ERT and a proper corporate forum for undertaking programs such as the seminar. Invitations were sent to selected ministers throughout the world and to bilateral, multilateral, and international agencies and organizations concerned with environmental protection during economic development.

A two-week series of presentations, case studies, discussion groups, and site visits was planned. Participants were encouraged to prepare brief country reports on specific environmental problems or issues of concern to them. These reports would then be used in the seminar as actual case studies for discussion and analysis before the entire group or within smaller groups of individuals concerned with common problems.

In order to help initiate a seminar aimed at some fifty individuals of high rank and diverse national and educational backgrounds, a fictitious case study ("Develotech Siting Commission"), which features a newly appointed deputy environmental minister shouldered with the task of operationalizing bold political statements in the face of conflicting national demands for scarce resources, was prepared. Participants were to read this case study at the outset of the seminar, and assume the role of the central character, thus ensuring a common frame of reference in which all could lend their respective insights.

It was anticipated that some participants might have unreasonably high expectations of the U.S. Environmental Protection Agency as a source of solutions to their environmental problems. The origin, purpose, and early survival of this agency was de-mystified in a case study titled "William D. Ruckelshaus and the Environmental Protection Agency," prepared by the Kennedy School of Government of Harvard University. The experience of Mr. Ruckelshaus proved to be one that many participants could identify with, and his emphasis on the need for administratiave strategy taught a valuable lesson.

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Execution

Between 1979 and 1981, the annual seminar graduated over 100 participants from 30 countries and 6 international organizations. Participants included a handful of ministers, including ministers of natural resources, development and planning, and lands and natural resources. Many deputy ministers attended on behalf of their superiors, and a variety of top level representatives from various organizations attended with a particularly urgent need to resolve issues of environmental protection raised by rapid industrial utility, or petroleum development. The balance of the participants included heads of pollution control units planning officers, university professors, and representatives from international agencies and corporations.

The content of the seminar has largely remained the same with relatively minor changes made for currency and improvement. The seminar has been designed to balance a consideration of strategic administrative planning at the national level, centralized around the Develotech and Ruckelshaus case studies, and an exposure to specific disciplines and techniques that, together, comprise integrated environmental management.

Specific topics have included: Opening statements by senior representatives of the World Bank and the United Nations Environment Program; The Role of Standards and Regulations; Principles of Environmental Monitoring, Analysis, and Prediction; Air and Water Monitoring; Environmental Impact Assessment; Environmental Strategy at the National Level; Case Studies on Environmental Economics, Trade-offs, and Strategy; and various site visits.

Social events have included dinners, attendance at the Boston Pops Orchestra performance, a Boston Red Sox baseball game, and a visit to the New England Aquarium and Dolphin Show.

It should be emphasized that satisfying the interests of such a large and diverse number of people for two consecutive weeks is no easy task for the seminar director, no matter how sound the program. A nearly continuous stream of breakfast and late evening meetings with different sets of participants was necessary to allow a formative feedback and evaluation process, which proved critical in making major and minor adjustments during the course of the seminar.

At the end of each seminar an evaluation was conducted, in which participants filled out forms to assess the program, its strengths and weaknesses. All but two responses during the three years indicated that ERT as a private company, should continue to offer international seminars of this type. Well over 90% rated the program very valuable, and over 80% indicated that the seminar would change how they make decisions.

A follow-up evaluation to assess the value of the seminar to participants back on the job for a year or more was initiated in July 1981. Twenty-three responses have been received to date. Of these, 78% (18) reported that they have been more confident in meeting their job responsibilities, 65% (15) reported that the seminar motivated them to seek out and participate in additional environmental activities, 39% (9) reported that the seminar helped to increase their job responsibilities, and 78% (18) reported that the seminar has helped them make better decisions. Two reported that the seminar had helped them get better jobs, and that the seminar was a very important factor in the job change.

NATIONAL PROGRAMS

The national scale case studies are models of comprehensive efforts for single audience groups. The programs presented can be separated by their audiences into youth group projects, programs for teachers, programs aimed at the general public, and national curricula for primary and secondary students. Many of the youth group activities described involve young people in active work on environmental problems. This is the case in Zdravko Petkovsek's air pollution monitoring project. Thousands of Yugoslavian youths collected data on observations of air pollution sources, atmospheric conditions and lichen growth patterns.

The Council for Environmental Conservation Youth Unit described by David Witherington and Stephen Joseph furnishes a bridge between youth organizations and environmental action groups in Britain. Its activities focus on student action and empowerment. The introduction to the case study examines the obstacles to youth activities and the evaluation explores the question of involving students in activities concerned with root causes versus symptoms.

The university students' research in Czechoslovakia contributes to solving social problems. There, according to Ladislav Paule, students do research in a variety of areas and then attend conferences to share results. One conference and research area is the "Protection and Conservation of the Human Environment." The students select topics for this conference ranging from the natural environment to the social aspects of the human environment.

University students also participate in the Kenya Wildlife Clubs, whose membership also includes groups from seminaries, medical schools and primary schools, but whose primary membership comes from secondary schools. These clubs originated at the interest of students and their teacher in studying and visiting the game parks. They now cooperate in funding and programming with schools, government offices and foundations. The case study details the organizational structure as a reference for readers who would emulate the club's activities in their own settings.

The waste project outlined by B.J.L. Papendorp is a cooperative project of many organizations all working together on one theme, "waste." This pilot project in the Netherlands has the dual objectives of positive action regarding the waste problem and establishing cooperation and exchange of knowledge among diverse organizations concerned with the environment. Their education is primarily of the general public and is linked with action. The article emphasizes and details the organizational framework to implement such a project.

Another example of organizations' cooperation is provided by Anne von Hofsten from Sweden. She enjoins environmental experts and educational leaders to combine their expertise to produce quality environmental education. To do this, environmentalists work on a training project of key resource teachers who will then lead environmental education efforts in their regions. The case study defines the goals of environmental education as attitude formation and knowledge acquisition and provides guidelines for assisting schools and teachers unfamiliar with environmental education.

The Gould League in Australia is another organization which provides environmental education assistance to schools and the general public. Celia Johnston and David Tribe describe the evolution of the work of this organization, focusing on the New South Wales group. Working in conjunction with state governments, The Gould League provides teacher inservices, a weekly TV segment, resource publications and programs.

The Caribbean Conservation Association efforts in Barbados also provide an example of environmentalists providing assistance for education in the schools. In this country the environmentalist group acts as a catalyst to environmental education by providing a speakers'bureau on environmental topics for secondary schools. The speakers are experts in their field of specialization who volunteer for the project. The Barbados experience shows the importance of starting with teachers, not students, as well as the enormous amounts of time and energy a successful program demands.

Another catalyst program to overcome the barriers to environmental education and facilitate school involvement is presented by Bob Stevens, James Richmond and Lee Williams. Their Australian case study describes two projects to initiate environmental education in remote areas and opens with a discussion of research on these barriers. An advisory team visited schools and wrote reports on field sites and the community, including multi-disciplinary activities for the site and historic, vegetation, geographic, and land-use aspects of the community. The Mobile Field Study Unit illustrated in this case study took primary age children camping, and at the same time demonstrated outdoor activities and teaching techniques to their teachers.

The remaining four case studies in this section describe national curricula for primary and secondary schools. Two programs use agriculture as a framework. In Israel, Abraham Blum describes the transformation of an agriculture curriculum, developed as a national science study for rural populations, into a socially and culturally relevant science curriculum for urban Israel. The lessons take students out of the classroom and laboratory and involve them in gardening and also explore the political and social questions of topics such as DDT and hunger. The case study includes details of these latter two units. The DDT laws stress the need to look at the full range of options of pesticides and alternative control methods.

The national environmental science curriculum in Zimbabwe has evolved to an agricultural emphasis with the new emerging national situation. Caught by political changes in its genesis, this curriculum deals sensitively and pertinently with topics and concepts demanded by the new nation. Sylvia Parker and David Witt describe the program, and include two syllabus wheels, which are valuable models and useful graphics of the content for environmental science for primary level children. There are also usable examples of low-cost teaching aids.

The last two studies are programs which reflect an interdisciplinary and issue orientation. According to Gunter Eulefeld in West Germany, environmental education was integrated into the syllabus of all subjects, but still fell short because of a failure to explore problems in a cross-disciplinary fashion. His case study therefore provides detailed guidelines for a cooperative program between biology, geography and social studies in a problem-solving format.

The Brazil project characterized by Myriam Krasilchik is applicable to science, social science, language and art. The curriculum attempts to develop students' ability to think logically and critically and to make decisions. To achieve this the students actively participate in laboratory activities, structured discussions, games, simulations and research projects. The case study depicts teacher training efforts and evaluation and revision of the curriculum. The evaluation calls attention to teacher attitude as the major obstacle to such a nondirective, value-oriented curricula.

These national programs provide examples of large-scale attempts to accomplish the goals of environmental education by projects aimed at audiences across a nation. The national curriculums can take environmental education to all the students in a country by directive of the national government. As the cases point out, teacher training and cooperation and coordination between and among educators, environmentalists and environmental organizations are necessary to successfully implement such centrally initiated, comprehensive programs.

THE COLLABORATION OF YOUTH IN INVESTIGATION OF AIR POLLUTION IN SLOVENIA

by Dr. Zdravko Petkovsek (Yugoslavia)*

INTRODUCTION

In many towns and in some districts of Slovenia (northwest Yugoslavia) the air is usually highly polluted in winter. The regulations for clear air are not very effective, if people are not aware of the danger of air pollution. The Yugoslav self-management system is such that the care of air pollution belongs to local authorities acting by self-management agreements. One of the most widespread associations, the Natural History Society of Slovenia, organized after-school clubs for nature studies. Active work in the field should increase students' knowledge and help them recognize environmental problems. The organizational coordinator was M. Gosar, who was supported by many members of the society, authors of the instruction booklet (Bracko, et al., 1977), school authorities, mentors, etc.

The work in clubs in this action included two main spheres:

1. Determination of air pollution sources and atmospheric conditions for its transport and dispersion.

2. Determinations of consequences of air pollution by studying the extension and the number of lichens.

In this article the necessary preparations, course and results of the action will be presented with the intention that it might be repeated elsewhere with the same or greater success and satisfaction.

CHARACTERISTICS OF THE TREATED COUNTRY

Slovenia is situated on the southeast part of the Alps between the Trieste Bay of the Adriatic Sea and the Panonia lowland--covering approximately 20,000 km, with a population of two million and the central point at 46 N and 15 E. Relief is very complex: among ridges, some reach over 2000 m.a.s.l., there are valleys and basins where the majority of the population lines and where we find most of the industry and other air pollution sources. The winds in this country are usually weak, due to its site on the lee side of the Alps with general circulation from the west. In valleys and basins in addition, very often cold air lakes are formed, in which only very slow air motions develop, because from above the cold air lakes are closed by strong temperature inversions (Petkovsek, 1973). Such situations develop in spring and summertime only at night, in autumn and wintertime, however,

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they can keep up for many days together, which results in high air pollution. The volume of the air under inversions in valleys and basins is small and there is no exchange with the upper layers. Although emission is not abundant the pollution of air increases to unacceptable values (Paradiz, 1970).

The country laying to the south of middle Europe has yearly mean temperatures about 10°C and between 1000 and 3000 mm. precipitation, rather equally distributed over the year. The vegetation is therefore rich but in the districts of high air pollution, also partly affected (Gabrscik, et al., 1976). There are plenty of trees, throughout the country, which provide good conditions for development of lichens. Different types of lichens are widespread in all regions, except areas of considerable air pollution.

PRELIMINARY WORK FOR ACTION

Many fundamental and secondary schools had already organized clubs for nature studies, with mainly biology teachers as mentors, even before this action. To inform the school authorities, mentors and pupils about the aim and the plan of action, a booklet "Investigation of Air Pollution in Slovenia" (Bracko, et al., 1977) (IAPS) was prepared. In 48 pages with drawings and color pictures, the basics of air pollution problems were presented with basic knowledge, ideas, conceptions, models and solutions, and instructions for observations and forms for their systematic notation.

The first half of the IAPS booklet includes the sources and dynamics of air pollution. The main air polluters, industry (motor traffic and domestic heating) and their sources (stacks, streets and urbanized areas), are laid out. The connection between the sources and receptors, as well as the most common pollutants, their characteristics and consequences, are explained. The dynamics of temperature inversions, the stable air conditions which lead to them and the resulting increases in air pollution are detailed. In situations of inversion caused pollution, concentration slows local air movements and the height of the inversion layer becomes very important These can be evaluated by relief characteristics (Petkovsek, 1978b). Their observations could contribute to better knowledge of these parameters in their own localities.

For the realization of the mentioned tasks, five forms for notation of observations were prepared and printed. All forms have sufficient place for notation of data about school, mentor, observer, location and date; but separate windows were prepared to note:

1. Register of sources (of air pollution)--single answers Type of heating at pupil's home, type and amount of used fuel, number of family members living together, most important sources of air pollution in surroundings, the worst source, and: "What should be done in your opinion to improve the air quality in your district--with moderate expenses?"

2. Register of sources--repeated observations: 1) count of motor vehicles on a nearby frequent street for half an hour at the same time for several days, with the added notation of characteristics of traffic (slow, quick, with stagnations); 2) duration and characteristics of an abundant air pollution source emission in surroundings.

3. Register of spreading conditions--single answers: descriptions of relief and climatic conditions of the area, characteristics of the neighbour stacks, prevailing wind before and after bad weather, assessment of air quality in the area, direction from which the most polluted air is advected, etc.

4. Register of weather conditions--regular observations two times daily at least for some weeks: direction and form of plume from one low and one high stack, direction and dimension of rime (at temperatures below 0° C), fog and its density, relative air quality and comments about other weather phenomena.

   Special instructions were attached to this form for determination of air motion and stability--plume forms (1-5), fog density (0-3) and air quality (1-3).

5. Register for height of upper boundary of fog (inversion layer), for pupils living on the slopes above the valley fog.

Filling out these forms stimulated the young boys and girls to think about these problems, to make active observations, perform systematic work and cooperate voluntarily and without much preliminary work and expenses.

The second part of the action and therefore the second half of the booklet IAPS is based on similar action in England by the Advisory Centre for Education and elsewhere (Ferry et al., 1973). This part of the booklet presents the characteristics of lichens, their division into main morphological types, i.e., crustose, foliose and fruticose, the main facts about their development, manner of life, extension, sensitivity to air pollution and its causes, particulars for recognition, how to distinguish them, etc.

Possessing this knowledge, the pupils can make excursions from home in different directions for some kilometers. In appropriate places they look for lichens: location, date, height. a.s.l., type of landscape and trees, characteristics of urbanization, and the number of lichens by type and substrata, stone, soil, bark, other. Instructions are added on how to carry out the excursion, where to find the lichens, etc.

On the basis of many such excursions the appropriate lichen belts, and finally the lichen map of the area can be drawn. By this one can distinguish: e.g.,

Belt E--none or only stunted lichens can be found--highly polluted district.

Belt D--in cracks of bark and at the roots, only crustose lichens are found

Belt C--beside crustose, foliose lichens can be found also

Belt B--beside the first two also some fruticose lichen can be found

Belt A--abundance of all lichens can be found--clear air area.

On this basis, a map of lichen extension and abundance can be made, representing at the same time the map of prevailing air quality in the region.

THE COURSE AND RESULTS OF THE ACTION

The information and instruction IAPS booklets were sent to 270 primary and 42 secondary schools of Slovenia. Enclosed were invitations for one-day seminars for mentors. 213 or nearly 70 percent of the schools sent on their expense the teachers marked as future mentors for clubs in this action to the seminars. After the seminars they promptly organized the work and after one year we received over 2000 filled registers, i.e., the results of pupils' work and observations. It was obvious that the action awoke great interest and was a success.

After the first year a meeting of mentors and some pupils was organized to exchange the experiences and some results, which were encouraging. It was found that the young boys and girls have mainly correctly accepted ideas, expressions, problems, quantities, units. etc., they have learned the connection between fuels and air pollution sources of air pollution, atmospheric conditions and how to observe them, they have learned about lichens, trees. landscape, etc. Very interesting were the answers to the last question of Register 1 which show that young people know how to achieve better air quality in their area. The other answers and data have shown as well a rather big interest of youth in nature and environment. On the basis of the first year data, a preliminary lichen map was made.

Where there were a lot of observations, the forms were sent back to the best club of the area along with a local map of sources windroses and other weather characteristics of their region, based on the pupils' information.

At the mentioned meeting the prolongation of the action was accepted with enthusiasm and at the end of the third year over 6500 registers came from young hands. The data is still to be analyzed for the final report and the final lichen map of Slovenia. However, the main goal was already reached; thousands of young boys and girls have voluntarily learned the problems of air pollution by taking part in observations in nature and discovering that the way to success leads through systematic, steady and careful work.

Probably such or similar action can be feasible with the same or greater success elsewhere in the world as a contribution to the care about our environment.

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STIMULATING YOUTH INVOLVEMENT IN ENVIRONMENTAL PROJECTS: COUNCIL FOR ENVIRONMENTAL CONSERVATION YOUTH UNIT

by David Withrington* and Stephen Joseph** (Great Britain)

"People have been worrying about and trying to improve the quality of their surroundings for a long time. The first attempts to reduce London's smoke were made in the 13th century and Elizabeth I was the first of many to try to limit the growth of cities with 'green belts.' Battles to protect animals, the countryside and old buildings have in the last hundred years spawned many now well-established organizations. Environmental concern and action has grown recently when serious problems like pollution, loss of wildlife and the over-use and wastage of limited natural resources have appeared to be growing without anything being done. ...All these problems need to be faced and examined, but where do young people come in, apart from making themselves informed on the issues, as good citizens?

"Young people's own environments are affected by these problems. ...Young people need to think about these issues and about what sort of environment they want. They can also take action.... Practical action by young people to improve their environment can contribute to their own development helping them understand how the environment is shaped. It can also--importantly--be fun" (CoEnCo Youth Unit, 1981).

This study traces the development of a national unit for out-of-school environmental education for young people--its origins, its objectives, some of its problems and achievements, and its future prospects.

BACKGROUND AND ORIGINS

Britain is a small, crowded island with a highly urbanized (or suburbanized) population, depending upon well-established industry and commerce, and mechanized agriculture. Britain has a strong tradition of natural history and an estimated membership of three million in various clubs and societies concerned with conservation. This is perhaps surprising in a country whose land has been so shaped by the hand of man that little wilderness remains. Its principal wildlife resources are the birds and seals inhabiting its estuaries and Atlantic seaboard.

Although school education is compulsory and universal up to the age of 16, there is very little formal education provided in environmental matters--something which the Council for Environmental Education, founded in 1968, is seeking to remedy. Responsibility for schools is decentralized with most control resting with local authorities and head teachers. Unlike most other countries in Northern Europe where there is a tradition of national self-governing youth organizations concerned with environmental conservation, out-of-school environmental education

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for young people in Britain is carried out in a piecemeal fashion in several different types of organization.

In the spring of 1976 the Council for Environmental Conservation (CoEnCo) at the suggestion of its Chairman, Lord Craigton, approached other bodies, including the Royal Society of Arts, the Council for Nature and the Council for Environmental Education to see what might be done to stimulate the development of out-of-school environmental education for youth. As a result David Withrington was invited to undertake a national survey of programmes currently available to young people, to identify ways of involving more young people and possibilities for creating new programmes and improving the quality of existing programmes.

The survey provided details of 24 organizations with environmental education programmes for young people and a further six national youth organizations which were interested in developing such programmes. The chief obstacles faced by these organizations were:

--lack of finance;
--lack of recognition and support by authorities;
--lack of trained personnel; and
--apparent apathy of young people.

Organizations contacted during the survey were asked what action could be taken at the national level to support out-of-school environmental education. They looked for a much more positive attitude to environmental activities in schools and in the Youth Service, backed up by training courses for youth leaders. Many respondents were critical of the low standard of environmental teaching in schools and saw opportunities for greater links between formal and out-of-school environmental education. Several organizations, particularly those seeking to embark on environmental projects, wanted a central reference point to turn to for advice, ideas and materials. Cooperation between organizations sharing resources and facilities and avoiding duplication of efforts would also be facilitated by the coordination and dissemination of information. Organizations undertaking environmental youth programmes sought greater support, both financial and moral, from central and local government authorities.

CoEnCo, itself a coalition of environmental organizations, decided to raise funds to set up a Youth Unit to promote and coordinate environmental activities for young people out of school. In this it was successful thanks to a grant from the Dulverton Trust, and two permanent staff were appointed in 1978 from over a hundred applicants. Since then two more staff have been appointed with the help of further grants, including a regular subvention from the Department of Education and Science. Projects have been funded by grants from industrial companies, from trusts, and from other government departments, especially the Department of the Environment.

STRUCTURE

The first task of the Youth Unit was to persuade various organizations to develop environmental projects and to provide ideas and examples of what could be done. A Youth Committee was set up by CoEnCo comprised of representatives of major youth and environmental organizations. The Committee serves a dual function:

—to advise the staff of the Youth Unit, provide them with contacts and a sounding board for their ideas;

—to act as a forum for exchange of information between the organizations represented.

The staff of the Unit includes a Director, Assistant Director, Secretary and Natural History Officer. The latter services a Natural History Youth Sub-Committee, which CoEnCo inherited from the Council for Nature when this organization, which had organized "National Nature Weeks" and the "Countryside in 1970," was disbanded in 1980. The staff are themselves young people who have expertise in environmental education and perhaps, by their example, can demonstrate that young people are capable of planning and executing their own environmental activities.

PROJECTS

The projects promoted by the Unit have been selected for their relevance to young people and their local environment and how they fit in with what other groups are doing or could do. Emphasis has been placed on activities which young people themselves plan and carry out. The objective is for young people to be able, through such activities, to overcome feelings of powerlessness and alienation and convince themselves that they can influence and help to shape their local environment.

Wasteland

The pressures on available land in a densely-populated country like Britain are enormous. The Youth Unit has highlighted the potential of vacant land and buildings, especially in inner city areas, for providing youth leisure facilities. Such facilities are in short supply and, in view of the low priority given to them in public spending programmes, are well suited to self-help action. The Youth Unit has worked closely with Fair Play for Children, a coordinating body for play organizations, which has promoted the use of wasteland for play space. The results have been:

—publication of a fact sheet Waking up Dormant Land (1979) as a follow-up to a BBC television programme Junior That's Life;

—publication of a report describing some 50 schemes undertaken by or for young people, that had made use of vacant land and buildings Waking up Dormant Land (1981). This was extensively reviewed in the press and recommended by the Department of the Environment to local urban authorities; and

—a practical demonstration project at Waterloo in central London, where the Youth Unit was one of a number of bodies involved in creating a community garden on a small vacant plot, showing the potential of even the tiniest of sites.

In 1978 the Youth Unit helped to set up the Wasteland Forum, which brings together interested groups and individuals and is continuing to assist young people and voluntary groups to make use of wasteland.

Farming and Wildlife

Conflicts between agricultural productivity and the protection of wildlife habitats form one of the main environmental issues in Britain at present. In many areas, however, farming and wildlife advisory groups have been set up to bring the two sides together. The Youth Unit took up this issue as an initial project, and during 1979 produced a Habitat Guide to Farmland, a manual based on the Somerset farm owned by Mr. Ian Macdonald. who represents the Country Landowners Association on the CoEnCo Youth Committee. The aim of the manual is to help young people do a survey of the wildlife on the farm during a year, and this is then followed by the production of a management plan. Although the manual as it stands is site-specific, it has been widely used as a model for other sites.

During 1982 a grant was obtained to take this work further, and plans were produced for a project aimed at rural youth groups. It is hoped to cooperate on this with the National Federation of Young Farmers' Clubs, who already have a good record in conservation projects and countryside interpretation. This project is particularly important in view of the Wildlife and Countryside Act 1981, which lays new duties on farmers and landowners to conserve wildlife.

Urban Renaissance Campaign

In 1981-82 the Council of Europe sponsored a Campaign for Urban Renaissance to highlight good practice in improving the environment in towns and cities in Western Europe. CoEnCo itself played a significant role in the UK National Committee for the Campaign and helped to bring into being a new "Urban Initiatives Fund" to be run by government.

The Youth Unit undertook two special projects:

a) the production, in collaboration with Community Service volunteers, of a leaflet, Tower Blocks and Trees. This gave examples of practical projects, included a board game based on "snakes and ladders" and provided a range of views about cities in the form of an imaginary discussion by a municipal council.

b) the mobilization of young volunteers for practical conservation work in the Blackbrook Valley, a large area of degraded and derelict land in the West Midlands, part of which was declared an "Enterprise Zone" by the government. The Youth Unit teamed up with the Nature Conservancy Council and the Landscape Institute in devising projects to conserve and enhance wildlife habitats and landscape features in the area and made contact with local youth workers and youth centres to get these plans into operation. The coordination of this effort has now been taken over by local authority field workers.

Natural History and Countryside Conservation

The Youth Unit has been interested in the use made of the countryside by youth groups, and held a seminar on "The Countryside and Young People" at the Natural Agricultural Centre in Warwickshire in 1979. Speakers at this seminar emphasized the existence of "countryside" in urban areas, notably the wildlife that colonizes waste ground and parks and the "city farms," nearly 50 of which have been set up by local groups in towns and cities around Britain to interest inner-city dwellers in plant cultivation and the care of farm animals.

A further dimension was added to the Youth Unit's programme when it took over the youth work of the Council for Nature in 1980, together with an extra member of staff and a Natural History Sub-Committee. The Youth Unit continued the series of "Nature Fairs," developed by the Council for Nature, at which local schools, youth groups and environmental organizations exhibit their environmental projects. One was held in Cheltenham in 1980 and in 1981 a local project officer, paid for by an experimental project grant from the Department of Education and Science, arranged fairs at Poole and Weymouth. Although these fairs attracted large numbers of young people and helped to coordinate environmental work in the areas concerned, they were largely school-based; the Youth Unit has decided that their purpose could be better achieved in other ways.

The concern felt within the Youth Unit that conservation organizations should involve young people in their work wherever possible led to a project with the Sussex Trust for Nature Conservation to organize activities for a group of Sussex Young Naturalists. The results were published for distribution to other county Trusts for Nature Conservation to encourage them to arrange similar activities. The Trusts already have WATCH groups for young children. The Youth Unit has produced a number of publications to interest young people in natural history and conservation work. A revised edition of a former Council for Nature publication, *Advice for Young Naturalists*, appeared in 1980 and has sold extremely well. A series of leaflets that encourage young people to relate wildlife to their present outdoor sports and activities was begun by the Council for Nature with *Young Climbers and Natural History* (1979) and continued by the Youth Unit with *Young Anglers and Wildlife* (1981). Other titles such as *A Walk on the Wild Side*, *Young Farmers and Wildlife*, and *Young Cavers and Wildlife* are in preparation. A leaflet originating with this series, *Wildlife in Towns* (1982), has become a larger project, aiming to interest urban young people in the wildlife that exists around them. The final publication to mention in this connection was also inherited from the Council for Nature: *A Handbook for Naturalists* was published commercially by Constable in 1981.

Natural history work is an important part of the Youth Unit's activities, for which the achievements of Council for Nature have laid the foundation. The Youth Unit has attempted to incorporate a wildlife "angle" into all its projects and its training work; it also intends to help youth workers to improve the trips they already organize to the countryside.

Employment

Youth unemployment has grown in recent years, in Britain as elsewhere in the industrialized world, to be the major problem facing young people and the organizations which work with them. With so many school-leavers unable to find employment, the government has been running temporary employment training schemes for young people since 1975 under the direction of the Manpower Services Commission (MSC). By 1981 there were 60,000 places for the 16-17 years age group in the Youth Opportunities Programme and 30,000 places for the age group of 18 years and over on the Community Enterprise Programme. Although most placements were in industry, several hundred young people have been given work and training with conservation organizations in projects such as restoration and insulation of buildings and management work on nature reserves

In an attempt to promote these programmes, the Youth Unit published Environmental Projects (1980) jointly with the National Council for Voluntary Organizations. One of the examples given quotes the experience of a trainee on a bird reserve project in Dorset on the south coast of England: "I was one of the lucky school leavers taken under the wing of the Youth Opportunities Programme who found exactly the sort of work I hoped for but never expected to find.... My job satisfies a multitude of my personal needs and also helps some of nature's marvelous creatures survive in a quiet and safe environment."

Not all these schemes have been as satisfactory as the one quoted. Some of those authorized by the MSC have not properly considered environmental needs; others have failed to provide participants with satisfying work or proper training Representatives of environmental and youth organizations were brought together by the Youth Unit to discuss these problems at the National Youth Bureau in 1981. A series of guidelines for good practice were drawn up and plans were made for pilot environmental projects to test them out. Their implementation has been delayed by uncertainty over the future of MSC schemes.

After a year of intensive debate including a Government White Paper and Task Group, to which the Unit contributed, it has been decided to replace the Youth Opportunities Programme in 1983 with a Youth Training Scheme. A number of proposals have also been put forward for a National Service Scheme, in which all young people would do a year of community or social service after leaving school. Environmental work has been suggested as part of this package. The Youth Unit has argued, in relation to these proposals and to the MSC schemes, that any work organized for young people must be seen by them to be worthwhile, must meet real and not cosmetic needs in the local environment, and must provide a proper training. There are dangers, as unemployment rises about three million in Britain, of MSC schemes being merely a palliative and creating cynicism among young people; less than 40 percent of Youth Opportunities Programme participants obtain employment at the end of the scheme.

To confront this problem the Youth Unit has collaborated with Education for Neighbourhood Change, a voluntary organization, to produce a booklet Don't Let Them Waste Your Time. Its aim is to help the young unemployed identify unmet needs and wasted resources within their local community. The resources which can be brought to bear by youth action include manpower, skills, tools, materials, transport, buildings and land. The booklet contains a "fact bank," a "programme schedule" and a strip cartoon showing a group of young people trying to put an idea into practice. It brings the environmental concept of "making the best use of existing resources" down from the level of the tropical rain forest to the urban street scene in Britain.

For the longer term, the Youth Unit is discussing with environmental groups and youth organizations the development of modes of employment which are compatible with the environment and will provide more and better jobs for young people.

And the rest...

In the four years of its existence, the Youth Unit has undertaken several other projects and has established contacts with an immense range of organizations and individuals in Britain. It has also made contact, through the International Youth Federation for Environmental Studies and Conservation (IYF), with environmental youth organizations in other countries. Several publications produced by the Youth Unit have been used by IYF member organizations, for many of whom English is the second language. In addition, a member of staff took part in the all-European Youth and Student Conference on the Environment held in Sweden in 1981, at which delegations from East and West Europe reached agreement on many environmental issues.

The Youth Unit has been able to make constructive comments on publications and initiatives aimed at young people by environmental bodies, such as Keep Britain Tidy Group's Youth Action Pack. Staff have also been involved in helping Shell UK revise and relaunch the "Better Britain Campaign," which offers grants, advice and awards to young people improving the environment. The aim of all this work is to improve the quality and quantity of the opportunities for young people to become involved in environmental work.

Training

The training in environmental activities of those who work with young people has been a major element in the Youth Unit's programme. Apart from publications and projects already described, the training work has been of two kinds: firstly, organizing special local conferences and courses and, secondly, helping youth organizations to incorporate environmental aspects in their own training courses.

The first approach included a pilot project in Cheshire, where some small schemes were initiated with staff from two New Town Corporations. However, the final conference had to be canceled and the topic was included in a regular annual training event for local youth workers. The Youth Unit took over responsibility for a series of conferences begun by the Council for Nature's Youth Committee and expanded them to encompass broader environmental themes. These conferences were usually run in conjunction with the local planning department and youth service and aimed to bring together youth workers and environmentalists from the same area. Conferences were held in Sussex in 1980, Norfolk, Buckinghamshire and Liverpool in 1981, and in Hackney, London in 1982. Others were planned but failed to happen.

This approach met with numerous difficulties, mainly stemming from the administration of local events from an office in London. Those courses adopted by local organizations were more successful, but even these fell down on public relations, especially over the printing and circulating of programmes. As a result, the Youth Unit decided in 1982 to concentrate on the second approach and talks and workshops were organized with a number of local youth associations, the Scouts and the British Youth Council. The Youth Unit wrote a booklet, Youth Groups and the Environment, which was published by the National Association of Youth Clubs, and has now been asked to prepare training tapes for NAYC part-time youth workers.

The main need has been to give youth workers confidence that they can organize environmental projects. The Youth Unit has produced packages or modules of training materials appropriate for the official youth service and for youth workers in voluntary groups. Programmes and awards are being developed for uniformed groups such as the Boys Brigade, backed by publications and materials. Publicity is given to existing facilities for out of-school environmental activities for young people. Another problem is that the mental image of the environment often equates with "countryside" and the Youth Unit has spent a lot of time persuading youth workers that everyone has an environment and that they can do something about it.

OBJECTIVES AND ACHIEVEMENTS

The initial hopes of its sponsors were that the Youth Unit would:

--involve more young people in environmental activities;

--seek to improve the quality of environmental education programmes available to young people;

--help to create a greater understanding amongst young people of environmental issues and encourage their active participation in community affairs.

The first of these objectives is being achieved through pilot projects sponsored by the Youth Unit, through advice and publications available to other organizations, through training of youth workers and through the general publicity generated by the Youth Unit's own existence.

The second and third objectives have been more difficult to realize and the staff of the Unit have decided to gather perhaps once a year in a hostel or other venue well away from the office routine for a few days to evaluate the effectiveness of their work. It is very easy to become submerged in responsive activity, answering requests for information and joining in other people's initiatives, and to lose sight of one's objectives. The Youth Unit has been acting as a bridge between youth organizations and the environmental movement, but its role must be more than that of catalyst. It must also look critically at the programmes and policies of these various organizations. Do they encourage young people: to make their own decisions? to discuss in what way a particular activity may be beneficial or detrimental to the quality of life? to exercise choice and influence over the way resources are used, transport is planned and recreation is provided for in the local community?

There are many aspects to every environmental activity. Take bottle collections, for example. Many bottles are nonreturnable nowadays or have been replaced by metal cans, plastic or paper containers. However, young people are often encouraged to collect used bottles so that they can be broken up as cullet by glass manufacturers. You could say that by collecting these bottles young people are helping to perpetuate a wasteful system. Would it not be better if the bottles could be returned to the drinks' manufacturer, washed and used again, or better still if customers brought their own containers to be filled up from a large tank at a shop or distribution centre? Would young people's efforts be better channeled into campaigning for a system which used less energy and resources? Should they also be investigating what liquids are sold in bottles and whether they are beneficial to our health, and how much land and money is being used up in disposing of old bottles in big rubbish tips or holes? As well as posing an environmental choice and responsibility, this one problem can provide considerable material for study, research and practical projects.

At the Youth Unit's training conference in Sussex in 1980, a guest speaker took up this theme under the title "The Way Forward": practical conservation work was all very well, but he compared it to organizing a chain of people with buckets to catch water leaking through the roof of a building. The right approach would be to repair the roof. Similarly, with environmental issues, it is the root causes that must be tackled rather than the superficial symptoms. This meant looking at the economic, political, social and moral aspects of problems.

The Youth Unit has injected this holistic approach into many of its publications and pilot projects. It has also utilized it in training courses for youth workers, inviting them in one exercise to comment on the environmental implications of advertisements in newspaper colour supplements. Perhaps more emphasis could be given to these aspects in policy discussions with other organizations over programme formulation. However, the criticism implied makes it a delicate matter to introduce into correspondence or conversation. Fortunately, young people themselves are naturally critical and often question the value of some of the activities and projects that they are undertaking.

The third objective flows from the second. Properly designed and executed programmes should develop greater awareness and understanding amongst participants and give them the motivation and confidence to take an active part in community affairs. That this is possible was demonstrated by the presentation organized by the Youth Unit for the Parliamentary Youth Affairs Lobby. Three youth groups from different parts of the country presented environmental projects. One group in Kent had started off bird-watching and had then gone on to organize a campaign against the dumping of rubbish on "green belt" land outside their town. A group of urban young people from the West London Branch of the Youth Hostels Association regularly undertook practical nature conservation tasks out in the countryside of the Chiltern Hills, while another urban group from the West Midlands carried out practical conservation work on National Trust properties and also acted as guides to people visiting these historic country houses. The Members of Parliament were stimulated; they had not previously realized the wide range of environmental involvement young people could achieve on their own resources.

Evaluation of educational programmes is extremely problematical. It cannot be just a matter of numbers. The effectiveness of training and project design is equally important. But how can we measure the benefits gained by individual participants and the improvement in environmental quality which we hope will result? It is quite clear that the forces working to destroy the environment are still dominant and that the efforts of the CoEnCo Youth Unit and the organizations with which it works must be renewed.

Looking to the Future

As well as logistical problems, such as trying to coordinate local activities from a central office and the inability to follow up with young people who have participated in particular courses, the Youth Unit is experiencing financial insecurity. In mid-1982 all staff at CoEnCo volunteered to work a four-day week as an alternative to redundancies. The outcome is not yet certain, but the Youth Unit has established a good track record as a servicing agency for youth organizations and environmental groups. It also receives financial support from the Department of Education and Science and recognition from Her Majesty's Inspectorate. Young people's problems are recognized as important and we are confident that sufficient funds will be forthcoming to enable the Youth Unit to develop its work.

When social and environmental problems are discussed in an international forum, such as that provided by the United Nations and its agencies, experts can draw up a list of logical and fundamental reforms. However as these come to be applied at the national level all sorts of obstacles to progress are revealed. In a comparatively wealthy society like Britain, the main impediments are not financial but institutional--with a system of attitudes, beliefs and customs which have stood the test of time and are not receptive to change.

Our hopes rest with young people, who question the world around them. They do not differentiate between ideas that conform to an established way of thinking and those which are at odds with it, because all ideas are new when you are young.

Reference

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ENVIRONMENT EDUCATION AND STUDENT SCIENTIFIC ACTIVITY IN CZECHOSLOVAKIA

by Ladislav Paule*

The scientific and professional activities of students are in addition to university studies in Czechoslovakia. It is a movement, which is principally organized by the Socialist Union of Youth together with state ministries, universities, academies of sciences and other scientific institutions which aim to mobilize young, talented and gifted university students for creative professional and scientific activity. These activities supplement the educational process at universities and in moving, from simpler to more exacting forms, encourage the independent creative activity of students. It acquaints them with methodological problems of individual scientific fields, it teaches them principles of scientific work and it develops preciseness and social responsibility in scientific work.

From a practical point of view the students' scientific activity could be seen in the following principal forms·

—scientific circles
—scientific researchers
—demonstrators
—differential education of talented students

In the first two categories the students deal with solving the research tasks of individual institutes. The activity of demonstrators is aimed at the educational process, while the differential education of talented students is the highest level of the university students' education and is aimed at the education of talented students according to their individual educational plans.

Participation of students in scientific activity presumes close cooperation between students and their lecturers. Students may be given research projects by the lecturers or they may choose a project themselves. The lecturers lead students in their scientific work and arrange facilities. All material, traveling expenses, laboratory works, computations, etc. are covered by the university budget, as are financial awards for the best papers at faculty and national conferences.

Traditional forms of student scientific activity culminate in student scientific conferences organized annually on a faculty or a national level. The faculty conferences are usually organized in April or May and are the forum for presentation of all projects carried out in the previous year. The national conferences are organized annually in

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University College of Forestry and Wood Technology, 960 53 Zvolen, Czechoslavakia.

individual scientific fields, such as agriculture, medicine, pharmacy, law, etc., where the best projects from faculty conferences are presented. At present 26 national students scientific conferences are organized annually in Czechoslovakia in which papers are presented in 215 special sections.

Among all national student scientific conferences, one has a special position: "Protection and Creation of Human Environment." The main reason for the organization of this interdisciplinary and thematically oriented conference was the fact that no university in Czechoslovakia has a full course for specialists solely in human environment studies. This subject forms part of many educational programs in most universities in Czechoslovakia, i.e., from justice, through forestry, agriculture, and chemistry.

From this point of view, such a theme-based conference has a very special position among student scientific conferences and creates a forum for discussion of research investigations at an interdisciplinary level. In this sense it represents the model solution of horizontal structure for the investigation of one common problem.

Organized student scientific activity in Czechoslovakia began in the mid-fifties. The greatest mass development of student scientific activity began in 1970, when the Socialist Union of Youth was formed which took among its principal aims also the students' scientific and professional activity. At present about 23 percent of all university students in Czechoslovakia are participating in this activity, and in some faculties this ratio is over 30 percent.

In this sense the University College of Forestry and Wood Technology, Zvolen, is one of the best in Czechoslovakia, with a level of participation above the national mean.

In the mid-sixties, the Faculty of Forestry introduced into the study plans more subjects aimed at problems of creation and protection of the human environment, e.g., landscape ecology, later nature protection, landscape deterioration, and recultivation, etc. It was quite natural that more and more papers within the students' scientific activity were aimed at environmental problems. This phenomenon was not confined to the Faculty of Forestry, but also occurred in other faculties in Czechoslovakia.

It was because of this that the first student scientific conference devoted to the human environment problematics was organized in Zvolen, in December 1972. In total, 45 students from nine facilities participated with 20 papers. This theme-based conference was well-accepted by the Central Committee of the Socialist Union of Youth as an innovation and since 1975 this conference has been approved as the national one within the unified system of students' scientific conferences and is accessible to students of all faculties in Czechoslovakia. Thus a new era of student participation in solving environmental problems began, not only on quantitative, but also on qualitative, levels.

The national conferences are organized annually and have increased in size over the years. Since the first national conference in 1975, the number of papers presented has doubled from 51 to 113, as has the number of participants, from 71 to 158. The number of participating faculties has also increased from 17 to 39. Within the last five years the number of papers presented has been more or less equal.

During the development of the conferences, their structure has been changed. The first conferences up to 1976 were organized in four special sections:

- Human environment in the socialist society
- Man and biosphere
- Man and technosphere
- Creation of human environment

Since 1977 there have been six special sections:

- Social aspects of human environment
- Ecological aspects of maintaining the natural environment
- Creation of natural environment
- Protection and creation of working and living environment
- Deterioration and hygiene of human environment
- Methodological aspects and technical aspects of human environment protection

The future conception of the students' scientific activity is that some conferences should be organized on an international level. In the first plan, there should be an International Students Scientific Conference in Economy, which is organized over ten years in Bratislava. Beginning in 1982, it is planned that every second year, the National Students Scientific Conference on Protection and Creation of Human Environment should be organized on an international level. Already, at the first conference in 1982, there were participants from five countries: GDR, Poland, Yugoslavia, Mongolia and Bulgaria.

International conferences aimed at environmental problems are already known in several other socialist countries. For example, in 1969 the College of Agriculture in Warsaw organized an International Symposium on Nature Protection and in 1974 Warsaw Polytechnics organized the International Conference on Human Environment Protection connected with interesting excursion with more than 200 participants from 19 countries. Similar conferences were organized also in Bulgaria.

Development of students' scientific activity oriented to human environment problems has recorded significant results within the last decade. Problems of the protection and creation of the human environment became the subject of many student research projects by which the students have contributed not only to environmental education but also to solving very important social problems.

WILDLIFE CLUBS OF KENYA

by Nathaniel Arap Chumo*

The Origin of the Concept of Wildlife Club

Wildlife Clubs of Kenya (WCK) has a unique history. It was the first indigenous conservation education programme in Africa. Between 1960 and 1970 many people in different parts of the world became aware of environmental pollution and dwindling natural resources. Consequently environmentalism became a household word in industrialized countries. Here in Kenya thousands of tourists flock into the National Parks and Reserves, thus creating a new phenomenon. During this period there was rapid transition from environmental indifference to environmental concern.

The Wildlife Clubs developed more or less spontaneously. Interviewing former students of Kagumo High School, where the first Wildlife Club was founded, I learned that the students and their teacher originated the idea of forming Wildlife Clubs in schools.

This teacher had a great interest in traveling to game parks. He took still pictures of various animals in these parks and shared them with his students. From time to time he challenged the students to identify different types of animals in the pictures. But how could they identify them? In responding to this question the idea of a Club which would enable the students to learn more about wildlife emerged.

Thus a few students and their teacher became organized and formed a club in 1966. The members initiated many projects, including building a Club Museum and the study of plants and animals on the school grounds.

Two years after the founding of the Club, the members wanted to challenge students in neighbouring schools to indulge in the kinds of activities they had started. So a letter was written to the Permanent Secretary of the Ministry of Tourism and Wildlife through their Headmaster. To their surprise, the Permanent Secretary not only offered to meet at Kagumo High School but also financed the first seminar in 1968.

The Kagumo Seminar

The student seminar which was held at Kagumo High School in Nyeri in 1968 was very important in the development of Wildlife Clubs. It was the first time in Kenya's history for representatives of students in secondary schools and colleges to meet to discuss the details of launching a youth movement concerned with conservation education. Following this meeting a number of Wildlife Clubs sprang up in Kenya.

The Ministry of Tourism and Wildlife organized the seminar as part of its National Wildlife Education Programme. Kagumo High School provided accommodation facilities. The seminar was designed to encourage the

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Wildlife Clubs of Kenya, P.O. Box 40658, Nairobi, Kenya, Africa.

formation of Wildlife Clubs in secondary schools and colleges throughout Kenya, and to explore a possibility of setting up a national body to coordinate Wildlife Clubs.

During the seminar the delegates divided into four groups, each to discuss a specific topic.

Group One was composed of delegates from Pangani Girls' Secondary School Nairobi; Nkubu Secondary School, Meru; Lenana School; Star of the Seas School, Mombasa; Strathmore College; and Kirangari High School, Kaimbu. This group discussed the facilities within schools which would enable Wildlife Clubs to be formed and run effectively. Among the recommendations made by the group were:

(a) Those who wish to join the Club must have genuine interest.

(b) A library be set aside for the Club in each school.

(c) Subscription be paid by each member on a term basis, and the Club in turn pay annual subscription fee to the national headquarters

(d) Members should participate in all matters concerning wildlife conservation.

(e) The Ministry of Tourism and Wildlife should waive fees for entry into the national parks for members wishing to visit the park.

(f) Seminars should be organized for Clubs' delegates every year.

(g) Essay and art competitions should be launched as part of wildlife activities.

The second group was made up of students from Kagumo High School, Alliance Girls' High School, Thika High School, Uasin Gishu Secondary School, St. Francis Girls' Secondary School and St. Joseph's Secondary School, Githunguri.

The subject of their discussion was, What activities can be organized by Wildlife Clubs during the school term and the holidays? The group's recommendations included:

(a) Members should visit places like national parks, museums, and animal orphanages.

(b) Camping outside the schools, especially in game parks under the protection of a game warden.

(c) Invite important people who know much about wildlife to talk to student members.

(d) Student members should endeavour to raise funds for their Club projects.

Activities to be done during the school holidays were:

(a) Make trips to game parks and report the observations to the Club.

(b) Talk to people in their home areas about the importance of wildlife and relay the feedback to the Club.

(c) Study plants and animals in their home areas.

The third group was composed of students from Loreto Convent, Msongari; Alliance Boys High School, Kakamega Secondary School, Migori Secondary School and Kenya High School. The subject of their discussion was "What would be the most effective national and international organizations to support the Wildlife Clubs?" After indepth discussion they identified organizations to support the Clubs as:

(a) African Wildlife Leadership Foundation

(b) East African Wildlife Society

(c) The Elsa Wild Animal Appeal

(d) The National Museums of Kenya and the Kenya National Parks.

The group also recommended setting up a newsletter for the Wildlife Clubs.

The fourth group, whose task was to explore the possibility of setting up a national body to coordinate the Clubs, was made up of student representatives from Nairobi School, Jamhuri High School, Pumwani Secondary School, Ngara Secondary School, Kisii Teachers' College and Maseno National School.

The national body would be nongovernmental, nonpolitical, charitable organization whose objectives were:

(a) To spread interest and knowledge about wildlife and the environment among the people of Kenya in particular and East Africa in general.

(b) To make people aware of the great economic, cultural and aesthetic value to natural resources.

(c) To develop a better understanding of the need to conserve natural resources for the benefit of the nation and its people.

As recommended by the Kagumo Seminar, a Council made up of representatives of the following organization was formed:

(a) Ministry of Tourism and Wildlife

(b) Ministry of Education

(c) National Museums of Kenya

(d) African Wildlife Leadership Foundation

(e) The East African Wildlife Society

(f) The Elsa Wild Animal Appeal

In addition, seven secondary schools were elected during the Annual General Meeting.

The Council meets from time to time to discuss and decide on matters of policy.

A full-time national organizer was hired to plan and coordinate programmes for the Wildlife Clubs in 1969. In the same year three issues of newsletters were produced, and in 1970 a second student seminar was held in Tsavo East National Park.

In 1971 there was further consolidation of the WCK Association as a national organization. The Trustees were elected and named as: Hon. Charles Njonjo, Kenya's Attorney General; Dr. Louis Leakey, a world-famous paleontologist; and Dr. Perez M. Olindo, Director of the Kenya National Parks. The late Louis Leakey was succeeded by his son, Mr. Richard E. Leakey, in 1972.

Other developments were the launching of weekly radio programmes aired as part of school broadcasts and the Mobile Film Unit. The unit visited schools to show films and deliver lectures to the members.

Organization of a Wildlife Club

A Wildlife Club is a fundamental unit of WCK Association. It is made up of members in an institution, usually students already studying for a particular course or examination. The facilities where they can do their activities are offered by the school.

Any school may form a Wildlife Club. Usually the students discuss among themselves the possibilities of starting the Club. When planning the Club, it is important to keep the location in mind, especially when considering possible Club activities. If they are on the Coast they could plan their functions to take advantage of the seashore. Further inland, there may be an interesting forest habitat to use. City schools will have different possibilities from those in rural areas.

In the end it will be the enthusiasm and work of the Club members that determines the success of the Club. There is no doubt that an active patron, usually a member of the teaching staff, is helpful; but some Clubs operate efficiently with minimum assistance from a member of the teaching staff. The role of a patron is liaison with school administration and the Club.

When the Club is being started the first thing to think about is the Club membership Because of the heterogenity of schools in terms of student composition, geographical location, school curriculum, and facilities, the members are free to decide on the number of students who may join the Club. They might decide that all those who are interested may join it or may restrict to a certain class. This largely depends on the overall school curriculum.

Club Organization

As with any club or society, there must be some sort of organization for the smooth and efficient operation of the Club. The Club elects officers as follows: Chairman, Vice-Chairman, Secretary, Treasurer and possibly a Librarian. As the need arises the Club's Chairman may wish to appoint committee chairmen for specific tasks.

Exchanging of ideas and the planning of Club activities occur during the meetings. Meetings are therefore essential for the smooth running of the Club. Of course meetings are not convened for their own sake, but there must be a specific task to be accomplished at each seating. The presence of each member will generate a great deal of moral support which will be appreciated by the Club membership. The Club meetings are held regularly on specific days of the week as allowed by the school's calendar.

A schedule of Club activities is developed by the committee at the beginning of each school term and information is passed on to the Club's membership in the form of a monthly calendar.

Club Activities

Club activities fall into two main categories: long range and short range. Long-range activities are those actions which are continuous over a relative long period of time, whereas short-range activities are accomplished during a single meeting. Short-range activities include debates, talks and lectures, nature hikes, field trips, slide and film shows and regional rallies. Long-range activities are exhibits and displays, club publications, newsletters, fund raising, club library, scrapbook, botanical garden, fish pond, beekeeping, bird-watching, nature trails, and club museum.

National Organization of the Wildlife Clubs

On the national level, WCK's objective is to disseminate information as widely as possible. This is achieved through the WCK's magazine called Komba, mailings of bulletins booklets and other magazines; a weekly radio programme, and series of field courses. The magazine, issued three times per year is a 50-page publication containing articles written by scientists and other people working directly with wildlife, as well as articles, poems, opinions and artwork contributed by the student members. It makes a good forum for Kenya's youth to exchange their ideas and enlighten one another about wildlife conservation.

The WCK headquarters staff now occupies an eight-room old museum building in Nairobi. Nine staff operate from this office. The staff are national organizer, editor of Komba magazine, an education officer in charge of Mobile Film Unit, an assistant national organizer in charge of the development of Lake Nakuru Environmental Education Centre, a financial officer, an assistant education officer in charge of audio visual aids, film library and camping equipment; membership secretary; a typist and a bus driver. A caretaker of Lake Nakuru Environmental Education Centre lives in Lake Nakuru.

A Regional Coordinator and her assistant work in Kisumu regional office coordinating more than 350 Wildlife Clubs and developing a Lake Victoria Youth Camp.

Membership

WCK headquarters maintains a membership register of all Wildlife Clubs and associate members throughout the Republic. The number of Wildlife Clubs in Kenya grew to 738 in 1980; according to a recent survey, Clubs had an average of 50 members. The breakdown was as follows:

602	Secondary Schools in High Schools
81	Primary Schools
19	Teachers' Colleges
3	Medical Schools
16	Technical Institutions (including Colleges of Science and Technology)
3	Agricultural Colleges
3	University groups
4	Catholic Seminaries
2	Registered Outdoor Schools
5	Approved or Rehabilitation Institutions (including Jacaranda School for Mentally Retarded Kerugoya School for the Deaf, Maseno School for the Deaf, and Undugu Boys Centre, a home for runaway boys.

The individual membership grew to 55,000 due to expanded programmes of activities in 1980.

Programmes and Projects

(a) Publications

WCK Headquarters continues to produce its magazine as described above. Other printed materials include: The Source Book (a project manual supplied to each newly-formed Wildlife Club), special circulars, and Conservation Bulletin to Wildlife Clubs and associate members. Conservation Bulletin is a bi-monthly newsletter designed primarily for associate members (alumni). WCK also produces membership cards, annual certificates for Clubs and associate members, and booklets.

(b) Field Courses

Field courses are organized by WCK headquarters as part of the National Conservation Education programmes. The courses are student seminars, teachers' workshops, regional rallies and Wildlife Awareness Weeks.

Student seminars have proved to be a very important factor in the development of WCK movement. Each Club is invited to send a student to the annual seminar, a field course usually held in Tsavo East National Park or Lake Nakuru National Park. These participants, many of whom are seeing elephants, rhinos, giraffes, etc. for the first time, gain much through practical projects, lectures discussions, film and slide shows and can spread more information to the hundreds they represent in schools back home. One such field course inspired students who viewed poached elephant carcasses marring the scenery at every turn, to organize a peaceful, public demonstration at Nairobi to show their disapproval of illegal hunting. They gathered 8,000 signatures for a petition to be passed to Kenya's late President Kenyatta.

Teachers' Workshop is organized once each year in a National Park for Wildlife Club patrons. Forty teachers attend each workshop The workshops are an in-service training designed to enable teachers to learn about current problems facing wildlife and the latest strategies which have been developed to solve these problems. More important is the fact that the teachers are taught how to organize Wildlife Clubs in their respective schools. The workshops are made up of practical activities, demonstrations, lectures, discussions, excursions, and research projects.

THE NATIONAL PILOT PROJECT ON WASTE: TOWARD A NATIONAL ADVISORY CENTRE ON ENVIRONMENTAL EDUCATION

by Dr. B.J.L. Papendorp* (The Netherlands)

HISTORY, INITIATIVE

Environmental education has a long history in the Netherlands. During the late 19th and early 20th centuries the voluntary nature conservation organizations did most to educate people about the environment, a task which they undertook in addition to their main business of promoting conservation of nature and the countryside by purchasing and managing important sites.

During the sixties and seventies several trends resulted in the establishment of a forum for discussion between the various environmental organizations. First, the increasing awareness and concern by the general public of the quality of the environment. Second, the recognition by voluntary organizations of the importance of providing information and education on the environment. Third, the appreciation of the increased need for cooperation between the various organizations involved in environmental education. Fourth, the recognition by the government of the benefits of stimulating environmental education.

The organizations involved in this forum were the National Council for Environment on the one hand and representatives of the Ministry of Health and Environmental Protection and Ministry of Cultural Affairs, Recreation and Social Work on the other. During discussions, in November 1979, the voluntary organizations agreed to work on the following:

a) the rapid creation of a national advisory body for education on the environment;

b) a survey of the need for environmental education and its coordination;

c) a proposed joint pilot project on environmental education.

Detailed discussions with the Ministry of Health and Environmental Protection resulted in the establishment of a National Advisory Centre for Environmental Education, to operate for a period of three years in cooperation with the voluntary organizations on a particular theme. The theme chosen was waste. Fifteen national and regional organizations agreed to join the scheme, having gone on record as saying that the advisory centre should be seen as a first step towards a more comprehensive and permanent body for the promotion of environmental education. They also stressed the importance of utilizing the experience gained as the result of cooperation between the various organizations and of building on the knowledge and experience gained in

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environmental education both by the participating organizations and by the staff of the advisory centre. All of this knowledge and experience could then be used as a basis for the further development of the national advisory centre. It should be noted that a preference was expressed for a small-scale advisory centre rather than a large central body which would both develop and coordinate overall policy.

The National Advisory Centre for Environmental Education and the Waste Project both officially came into being on 1 June 1981. At present the centre employs five permanent staff.

THE WASTE PROJECT AS AN ENVIRONMENTAL EDUCATION PROJECT

It is important for the organizations participating in the national waste pilot project, which is an environmental education project, to consider the scope, aim and content of environmental education. The idea is not for the organizations to come up with a common definition of what constitutes environmental education, but rather, through discussion, an exchange of experiences, and joint work on environmental education activities within the scope of the project, to gain a better understanding of the aims, possibilities and content of environmental education. The object of all this is to improve the quality of the work.

Environmental Education

Environmental education is a product of the combination of the definitions of the environment and education; it involves activities as part of a systematic process in which values are discovered and concepts explained so that the skills and attitudes can be developed which are necessary for a good understanding of the relationship between man, his culture and his bio-physical surroundings. Environmental education also involves training in decision-making and formulation of a code of behaviour on matters concerning the quality of the environment.

The organizations participating in the waste project stress that environmental education should not be considered as an end in itself, but rather as a means of protecting and improving the human environment. Environmental education should provide the means and the stimulus for individuals to have a real influence on those decisions which can lead to a more environmentally conscious society. There would, for example, be little point in promoting the collection of different types of household waste separately if at the time large-scale waste incinerating plants were being built everywhere.

Environmental education only has any real effect in an advanced state of democracy where the interests of technocrats and bureaucrats in no sense prevail over those of ordinary people. It involves resolving society's problems in terms of a social viewpoint The ability and willingness to accept the responsibility for this is an important basic principle of environmental education activities. The organizations hope to make progress towards a society which is more conscious by emphasizing the correlation between social (structural) change and individual change. This is based on the view which has evolved over a long period of time, that standards which apply to society as a whole and to individuals will have to be drastically altered if we are to give the ecosystem a chance to recover. In other words, environmental education and social education are both critical in a positive sense, based on respect for both humanity and for nature.

Strategy

Environmental education aims to change attitudes, paving the way for actual change in society. The objective therefore is to enlarge the social base in order to achieve a society more attuned to the needs of the environment. This means that environmental education should be primarily concerned with long-term strategy, whilst not of course excluding the short term.

Many problems require, or invite, direct intervention to prevent an undesirable fait accompli. Problems, in our immediate surroundings or on a worldwide scale--whether they involve a threat to the continued survival of an animal species, the steady decay of our inner cities or the large-scale destruction of tropical rain forests--demand a direct approach. If there is a lack of direction or action, the damage can be irreversible.

If environmental education is to capture the imagination of the public and be effective, it will have to concentrate on the short term and on rousing people to action against a background of long-term objectives in a worldwide context. An unnecessary distinction should not be drawn here between education and action. If action does not also involve informing and/or educating public opinion it is undemocratic and as such has no place in the environmental movement. This is equally the case with education which is not aimed at developing opinions and/or activities to reverse undesirable trends and is therefore best seen as a form of voluntary leisure activity.

It will be obvious that the various organizations participating in the waste project differ in their approaches and strategies. Some of them will emphasize instructive publicity aimed at bringing about changes in behaviour. Others will focus on observing nature with the idea of gaining new knowledge as the basis for a new approach. Still others will accentuate the links between society and the environment, examining relatively stereotyped social problems by means of specific environmental problems, with the aim of promoting more environmentally conscious and acceptable behaviour. The various organizations feel this pluralist approach ought to be seen as something positive, though it remains to be seen whether the impact of the project can be improved by an exchange of experiences and cooperation on subprojects, bearing in mind these differences.

THE PILOT PROJECT

The National Waste Project is a pilot project. This is the first time that so many environmental organizations have worked closely together in an educational field and for that reason alone the project can be regarded as an experiment.

The following aspects are being tested:

a) nationwide cooperation at all levels of the participating organizations; in administration, policy, executive and productive aspects,

b) cooperation at regional and local levels; the ability to coordinate the activities of the various organizations,

c) the structure chosen for the National Advisory Centre; assessment of how it functions and its value in the field,

d) the possibilities of stimulating environmental educational activities by a thematic approach,

e) possibilities and form/method of improving expertise (staff training),

f) the effects of the project on the various organizations.

Objectives

There are two main objectives in the Waste Project: the first one relates to the choice of theme, the second to the efforts to establish a permanent national body for environmental education, with cooperation between the organizations as its basis.

Subsidiary Objectives Re: The Theme:

The organizations agreed to the following general objectives:

a) efforts to reduce the amount of waste produced by changes in production, distribution and consumption patterns.

b) efforts to bring about a more effective use of raw materials through changes in manufacturing processes and the composition of products, e.g., reintroduction of deposit systems on bottles and encouraging re-use of waste products.

c) efforts to ensure that what is finally left as waste can be disposed of in the best interests of man and the environment.

Subsidiary Objectives Re: The Creation of A National Body

The voluntary organizations would like to have a clearly recognizable function, or to exercise an influence on the development of the national support body, its functions and its methods. Cooperation and exchange of knowledge are both preconditions for the type of environmental education envisaged in The Netherlands and also for keeping a grip on support structures in environmental education.

The project is restricted in the sense that the above objectives have to be attained through educational means. The organizations which preferably assist in bringing about the structural changes needed in the whole problem area of waste are supported in their efforts by the team from the National Advisory Centre. The variety of organizations involved ensures a variety of approach, methods and target groups for the various activities at local and regional level. The organizations both define the project's objectives and at the same time are the instruments by which they are carried out. A basic principle is that finance for local and regional activities should be arranged by the organizations themselves. The Advisory Centre should not function as a financial filter. The implementing organizations themselves will have to approach the authorities for grants, subsidies, etc., after discussions with them.

General Organization

The organization of the waste project is characterized by a structure in which cooperation between the participating organizations is the basis of all actions and has five different aspects:

a) cooperation to establish the content of the project;
b) cooperation on actual implementation;
c) cooperation in administering the project;
d) cooperation in evaluation of the project;
e) cooperation in the administration and running of the National Advisory Centre.

The National Centre has an initiating and supportive role to play in the organization.

Duties

a) policy preparation for the Education Forum;
b) secretarial duties for the Education Forum and the Management Committee;
c) supervision of the daily progress of the project;
d) theoretical and practical support of project groups;
e) evaluation of subprojects;
f) research.

To gain a good picture of the organizational form/structure of the project, we will review briefly the various cooperative links, and indicate responsibilities and mutual relationships.

Education Forum

The Education Forum functions as a platform for the participating organizations; it has a large say in defining the internal policy of the project. It is responsible for the general direction of the project, as determined in preliminary work by the Policy Content Committee or the project team. Participants in the Education Forum consist, or may consist, of organizations which consider themselves to be involved in environmental education. Certain organizations will concentrate on the production of methods and materials, whereas others will operate more as consumers, making use of materials which have already been developed and applying them for their own purposes. The functions and duties of the Education Forum are:

a) to establish and control direction of policy through the Management Committee and the Policy Content Committee, to implement it by means of project groups or subproject groups, and to be responsible for the waste project in general;

b) to function as a source of information for participating organizations on new developments in environment education and their social and political effects.

Management Committee and Policy Content Committee

The two committees are basically instruments of the Education Forum. The management committee consists of members/representatives of those organizations participating in the National Council for the Environment. The Policy Content Committee is made up of members of the Education Forum. The two committees have the following duties and functions:

a) Management Committee - relations with Ministries; financial and economic support; personnel matters; publicity and the press.

b) Policy Content Committee - advises the Education Forum on the policy to be pursued in the Waste Project.

Together with the National Advisory Centre team it produces papers on the objectives, content and methods of the Waste Project, which are then decided upon by the Education Forum.

SUBPROJECTS, ACTIVITIES

Procedure

Separate organizations carry out one or more subprojects within the broad framework of the waste project. Each organization submits a proposal stating objectives, content, methods, target groups, financing, time scale and any cooperation/work-sharing with other organizations. The Policy Content Committee discusses the proposal and makes a recommendation to the Education Forum, which then either approves or rejects the proposal. Depending on the nature and importance of the planned activity for the Waste Project, the cooperation can vary in intensity.

Emphasis

The many activities embraced by the Waste Project vary considerably in form, method, content and choice of target group, as a result of the multi-faceted approach opted for by the participating organizations. The participants have, however, indicated a number of points of emphasis:

content: It is important to continue to emphasize methods of waste prevention, including manufacturing processes.

method: It is stressed that staff training is an important tool to be used in achieving the aims of the project. It is also considered desirable that educational activities and activities on the part of private citizens to do something concrete about waste problems should be firmly linked; education is therefore a means to achieving social objectives. The organizations also consider it imperative to provide a "starter pack" of publicity material, to stimulate educational activities in the field of waste. This would consist of a number of brochures, pamphlets, etc., developed centrally, which would serve as a first response to the many requests for general information and/or educational material for publicity, courses and other educational purposes. The starter pack would also serve as a means of stimulating activities and requests for further information and of supporting environmental-educational activities in the area of waste.

target groups: The large number of organizations participating in the Waste Project ensures a large number of target groups. In addition to reaching the traditional membership of these organizations, it is considered important to extend the spread of environmental-educational activities from these organizations to other target groups, such as schools, training centres, evening classes, trade unions, women's organizations, etc.

The objectives of environmental educational activity will, in the view of the organizations, be more easily attained by using an integrated approach to target groups rather than dealing in separate categories of waste. The integrated target group approach will involve locally and regionally linked educational activities promoted and aimed at a number of distinct target groups.

project range: The organizations are of the opinion that all project activities should directly or indirectly benefit environmental educationalists working at local or regional level. Efforts will be made to ensure that the activities take place in as many different parts of the country as possible.

methods: It is important that a number of activities provide new experience of the methodology and didactic aspects of environmental education. Projects should therefore vary in terms of input, resources and implementation, in order to enable experience and knowledge in this area to be extended.

evaluation: It is imperative to supervise and evaluate the working processes of activities in order to improve the quality of environmental education work. Each individual project activity should be examined in order to establish how this can best be given form. and to establish the possibilities of using experience and knowledge thus gained for future activities in the field.

Present and Future Activities

It would be beyond the scope of this report to review all the activities which are at present taking place. We shall therefore just take a brief look at some of the present and future activities under the Waste Project.

In the first year the participating organizations have chiefly been involved in two main areas: the central development of a large selection of publicity materials for use in education on waste and establishment of educational waste projects amongst their own membership.

A large exhibition was assembled on the whole problem area of waste, with various specialist themes such as homes and factories. In addition to the general section and the thematic sections, each province included its own contribution describing specific problems relating to its own area. The regional contributions and how the exhibition was to be run was left to the regional environmental federations.

The exhibition is at present available in six different locations in The Netherlands and is being used very heavily.

A large number of publications on waste have been prepared, including brochures on recycling, chemical waste, and waste in general. The environmental organizations have produced written material specially designed for use in courses, and some publications on themes such as waste policy or household waste. An increasingly important aspect in disseminating this material is the use of existing series of publications in order to reach a larger readership.

A number of courses have been organized on the subject of waste for the membership of the participating organizations, and increasingly for outside groups such as interested parties within certain professions, women's organizations teachers, and other groups.

A number of regional action days have also been organized for environmental groups involved in the problems of waste, in particular chemical waste. The intention of these is exchange of information and experience, and in some cases setting up joint activities.

A start has been made on developing educational material for use in schools in collaboration with members of the teaching profession; a series of lessons on waste for use in either primary or secondary schools.

We are working on a number of slide series and video programmes for various target groups on a variety of themes on waste.

A national recycling fair was organized jointly with the Ministry of Health and Environmental Protection, the chief aim of which was to set up links and contacts between policymakers, regeneration and re-use projects, large and small-scale industry and private initiatives, and the provision of information and education on waste.

This recycling fair was undertaken on the assumption that environmental education will only have effect when the behavioural climate invites environmentally acceptable behaviour. Ecologically responsible behaviour is not possible in a society which does not attach great importance to ecological aims. Government and industry have a joint responsibility to create this favourable climate. In this sense, environmental education is aimed at these sectors too.

In the near future, efforts will be made to link publicity and educational activities to local, regional and national policy developments, such as the Government's proposal to start separate collection of chemical household waste. We shall also make efforts in the next few years to incorporate environmental education in the standard school curriculum, initially on the theme of waste. The environmental organizations are considering such ideas as an "information and ideas" sheet linked to environmental education and the possibility of specific training courses for teachers.

Finally, there will be increasing support and aid for activities based on the "integrated target group approach." Activities in schools will be linked to those of parent groups, of environmental groups lending their support, and of municipalities, which, in their policymaking on the waste question, will create the conditions for this kind of approach.

This integrated approach is expected to produce considerably better results.

CONCLUSION

The Waste Project and the National Advisory Centre for Environmental Education have now both been in existence for more than a year.

We still have a lot to learn about the possibilities of cooperation between a large number of environmental organizations the form this cooperation should take and the manner in which other organizations, target groups and outside experts can be involved. A lot of attention will still have to be paid to improving the quality of the educational activities, for which exchange of information and discovery and use of suitable methods and techniques are important preconditions.

All of the above needs more time to develop.

ENVIRONMENTAL EDUCATION IN SWEDEN: A PROJECT ON NATURAL AND TECHNICAL SCIENCE

by Anne von Hofsten*

The new curriculum (1980) in Sweden gives good possibilities for environmental education. The teachers on primary and lower secondary level however, have insufficient and unsatisfactory training for environmental education. Their practical means for such instruction are also limited.

With this in mind, the Parliament decided in 1980 that the local educational authorities will take more responsibility for a local approach to the instruction plan. It was also settled that special attention will be paid to natural science.

The government has allocated eight million Swedish crowns ($1.6 million) for 1981-82 for a recurrent training of five days for every third teacher on primary and lower secondary level. This means that within a period of five years about 17,000 teachers will get this training.

A few words of the Swedish compulsory school system covering three levels:

lower level	grades 1-3	7- 9 years old
middle level	grades 4-6	10-12 years old
higher level	grades 7-9	13-15 years old

In lower and middle level there is one teacher covering most subjects, while there are academically-trained teachers for each subject in the higher level. There is one curriculum with aims and objectives that must be followed in all schools. Local educational plans are made within the framework of these aims and objectives.

The recurrent training proposed by the Parliament is compulsory and held during working hours. The aim is to strengthen natural science in lower and middle level by training in facts as well as methodology, to train teachers in science in higher level and to show how integration and methodology can be developed between the levels and subjects and adopted to the local conditions.

All this provides the background for the National Environment Protection Board to act. In the following I will give an example of how we, as conservationists, have acted in order to improve environmental education.

We are consequently right now in a fortunate position regarding education in the compulsory school in Sweden. We have thus started a project "Environmental Education in School," in cooperation with the National Board of Education. This project comprises a survey of existing

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material on the subject produced by organizations, and the Environment Protection Board. Material from commercial publishers is not included as it is thought to be well-known. Another part is an environmental educational policy document pointing out what we, as environmentalists, think is a minimum of knowledge. The IUCN document "Optimal Knowledge on Environmental Education" (1977) was a good help. A third point was to outline concrete suggestions for environmental education according to the new curriculum. Most important was to find "resource persons," at least one in each of the 23 counties, and to inform and train them so that they in turn can train the teachers within their counties.

What has been done, and how? We found that there were no detailed recommendations for how the extensive recurrent training should be done, nor anything about the content of environmental conservation. So we decided to act and contribute to a domination of environmental matters in the training programmes and subsequently in the education at school! We had strong support in the curriculum.

A general goal for environmental education is to attain knowledge and attitudes on which efforts to provide a better environment can be based. Since education is one of the long-range instruments in environmental protection it must provide a holistic view of the interdependence between man and environment. Global problems concerning resource use, energy utilization and environmental degradation are of importance for the formation of attitudes. Education must, in addition to attitude-formation, also provide specific knowledge about the various parts of the environmental field.

We also knew there was a great interest in conservation among teachers as well as pupils but that teachers' knowledge of facts as well as of teaching methodology especially in the field, was weak. Another weak point was the lack of relevant material.

What could we do to promote environmental education, to anchor the information given in reality, to awaken curiosity and to transmit knowledge and understanding?

On the part of conservation we could hardly reach all Swedish teachers, not even all those attending courses. But, with the system of resource persons (teachers), we can extend our message to a local level. So we asked the regional education authorities to appoint an interested resource person and to give him/her opportunity to run courses and travel within the region. All 23 regions but two did so and the work could start. The money was provided by the government, as mentioned initially.

The first workshop for the appointed resource persons was held at the end of September 1981. The programme included the following items:

--How to initiate and cooperate in teachers'study days and courses for teachers?

--How to give personal support and advice to schools in the field of environmental education?

--Cooperation in the recurrent training of teachers within the framework of the project Natural and Technical Science.

--Encourage environmental studies at school.

--Initiate local planning of environmental studies.

The groups discussed also questions like:

--How can we reach the objectives of the curriculum?

--How can environmental education be integrated in other subjects?

--Can environmental education be concentrated on specific topics like forestry, farming, etc. and thus take in the whole situation and give a realistic background to such topics?

--Can biological facts, environmental problems and suggestions for measures be integrated in the education?

--How can the teaching methods be altered in order to give a more realistic view of environmental problems?

Environmental education can include natural and urban environment as well as living or working environment. The nature itself must be used to reach the objectives set up. Natural and by man-effected changes must be studied. The reason why must be emphasized--effects, interrelationships and ability to interpret what is seen for example. These points were stated for environmental education.

Environmental conservation concerns all teachers and all subjects. Teaching on a specific theme may be the only possibility to deal with environmental matters.

Other ideas given were:

--the school needs green areas for the studies (in this specific field the National Environment Protection Board has an influence by writing to local planners and recommend that green areas are set up close to the schools for educational purposes)

--different aspects like economic, legislative trade union, ethic, social, political, emotional and surviving must be dealt with, when environmental problems are discussed

--use living plants and animals

--use all five senses in nature studies

--use resources outside school like voluntary organizations

--use a teachers study day for an inventory of an excursion area for the school

--make an inventory of material for field work and put it together within easy reach for all teachers

The next step was a new conference when the resource persons were asked what they expect the National Environment Protection Board to do.

--a list of teaching material and practical examples

--possibilities to evaluate teaching methods

--summer courses in environmental conservation

--contacts with regional and local environment authorities would be valuable. Support from the Environment Protection Board is requested

--more PR for environmental education

--support for campschools

--practical guidance for the resource persons

--methodology in inventories for school purpose and help to make such inventories by the local authorities

--letter to local school authorities with request for environmental education to be put in the local education plans

--courses organized for teachers in junior level by the Environment Protection Board

--enhance production of material and more information about existing material

--global aspects of environmental protection

--help to make teachers aware of the problems

--fieldwork for teachers with experts

--excursions in the close vicinity

--excursions on various themes

--that conservationists every now and then participate in teachers courses

--what is realistic environmental conservation according to the Environment Protection Board

All this shows that there is a demand for support in various ways in environmental education.

This is how the Environment Protection Board has started. A close cooperation with the National Board of Education is a must. They are specialists in education, we in conservation. The appointment of resource persons and a training of them is essential. With their help we can reach teachers all over the country. They are motivated and interested in conservation and they have experience in EE. They need, however, support by new material, ideas for methodology and when and how to talk about conservation and how to emphasize its various aspects.

We have started with conferences in order to identify the problem. The next step is to evaluate the result of the methodology and work practically with field work.

An evaluation will take place in May. In the meantime, we try to meet the demand for support mentioned by an Environmental Education Bulletin that is sent to all schools (about 2,500 copies), to teacher training colleges and of course to the resource persons. The Bulletin will appear four to five times a year. It gives ideas for material in environmental education and how it can be used. A lot of scientific material on various conservation problems is published but not known to teachers. We have listed material useful for different levels and in the Bulletin concrete examples are given when and how this can be used. The reception of the first issue proves that we are on the right track.

Another of our initiatives is an educational kit on acid rain. Others will follow. A teachers course on technical aspects of conservation in the industries is a pilot project from which we expect very much. It is important for us that facts are given on how and under what conditions industrial pollution is regulated and what are the prospects for the future. There are too many misunderstandings. This is why we will publish a small brochure for schools on environmental legislation and how it works. Young people want to know facts on the means for getting a better environment.

What is, however, essential in all this, is that the conservationists push for better environmental education. This means a valuable support for educators who want to develop their teaching in environmental matters. It is a support for the policymakers who want to launch environmental education and it is a pressure on those who are not interested.

Secondly, the conservationists are the right people to help communicate what environmental education shall include and what materials exist. Thirdly, they can cooperate in organizing teacher training courses and give advice on experts who can assist. The educators themselves are the pedagogues and it is up to them to adopt given information to the educational situation. Fourthly, it is up to the conservationists to influence the curriculum planners. Fifthly, the conservationists must accept and realize that everything they are doing has an educational component. Otherwise we will never get the message through, never be understood or accepted.

THE ROLE OF THE GOULD LEAGUE OF NEW SOUTH WALES IN ENVIRONMENTAL EDUCATION IN AUSTRALIA

by Celia Johnston* and David J. Tribe**

The Gould League of New South Wales (NSW) is a semi-governmental body working under the auspices of the NSW Department of Education amongst teachers and pupils in schools. Through its organization, the Gould League gives schools practical assistance and support in developing environmental education. The League's history and growth make an interesting story for all environmental educators to read and reflect upon.

HISTORICAL BACKGROUND

During the early years of settlement in Australia, stories of strange birds and other animals were carried by sailors to people of other lands. Occasionally, people would make a sketch of a bird or animal that they thought particularly interesting. However, no complete records were made until much later. It was not until 1839, after settlement had been made on the western shores as well as the eastern seaboard, that a careful and detailed study of the wealth of Australian wildlife was begun.

This work was undertaken by an Englishman, John Gould, and his wife Elizabeth. They arrived in Australia in 1838 and in the short space of two years, these hardy pioneers, aided by collectors and explorers, went out into wilderness bush and brought back records of new species. They made sketchings and paintings of no less than 681 different kinds of birds. When Gould arrived in Australia, the continent was scarcely more than a name but when his book on the Birds of Australia was completed in 1850, the name was so familiar that the discovery of gold immediately placed it in the forefront of the younger nations.

About 70 years later, in 1909, the Victorian Education Department established the Gould League of Bird Lovers to honour John Gould and his work. On the 22nd of October, 1910, in Wellington, NSW, two teachers, Edward Webster and Walter Finigan, whilst sitting in the shade of trees in the local school playground discussed their concern about the endangering of native bird life. They felt that something must be done. Therefore, on this day the New South Wales Gould League of Bird Lovers came into being to perpetuate the name of John Gould and to encourage teachers and pupils toward an active interest in the study of our native birds.

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Within a short time this organization spread throughout New South Wales with the formation of branches in almost every school. Each branch was encouraged to carry out practical activities to preserve and protect bird species.

In 1936 the Junior Tree Wardens League was formed. This organization was similar to that of the Gould League, its role being to protect and plant trees and native plants.

In 1967 it was decided to amalgamate the two bodies and to cover a wider range of conservation issues. The new body was called the Gould League of New South Wales. The pledge was changed in keeping with its new and wider approach to education. "Earth is our home and I promise to try to keep it beautiful by learning to understand and conserve its soils, air, water, natural beauty and all its living things."

This new body now enlarged its role to one of conservation education, leading into environmental education in the early 1970s.

Its aims are:

(1) To develop an awareness of man's total dependence upon the interrelationships operating within both natural and man-made systems, and consequently the need for the maintenance of the optimum benefits for man from these systems.

(2) To develop an awareness of man's total dependence upon the resources of nature for his very survival and consequently the need for efficient management systems to optimize the long-term availability of the resources.

(3) To develop an ability for decision making and self-formulation of a code of behaviour about issues concerning environmental quality.

THE GOULD LEAGUE'S ACHIEVEMENTS

Following its new emphasis, the Gould League of New South Wales rapidly grew into one of the foremost environmental organizations working with teachers and children in New South Wales. Its growth commenced with the formation of the Gould League Advisory Service in the early 1970s. This service was run in a voluntary capacity by a small group of Gould League Council members. This dedicated group assisted teachers with ideas in environmental education, conducted the League's first inservice courses for teachers and commenced the League's weekly television segment on the environment. Soon the growing demands of teachers could not be met by this group. In 1974 the Department of Education in New South Wales seconded a teacher to the position of Gould League Education Officer. The first education officer, Frank Haddon, established the position. In 1977 the second education officer, David Tribe, was appointed who continued to further and extend the influence of the League. In 1981, owing to government cutbacks, these positions were amalgamated and a new position of Environmental Education Consultant/Gould League was created.

From 1974-1981 Environmental Education was promoted and established in a great many schools in NSW. Requests for assistance from teachers were met by school visits, inservice courses, lectures, demonstrations, assistance in structuring environmental programs and resource materials. Content included sensory environmental awaremess, use of school grounds and environs, establishment and use of natural areas, energy education, urban, natural and marine environmental education. Students ranged from kindergarten to year 12, colleges of advanced education, university groups, field studies and community groups. Interest was maintained through a 10-minute weekly segment on TV.

Realizing that all the requests for assistance from teachers of the services of the education officer could not be met, a Gould League Coordinator network was established all over the state. This network comprised college and university lecturers, field studies center teachers, administrative staff in schools, classroom teachers and the general public. These coordinators have various Gould League publications and act as an immediate support for teachers requiring assistance.

PUBLICATIONS

Through support from the Department of Education, the Gould League is given a grant to produce publications on environmental education. Its regular publication is called the Gould Leaguer which gives teachers guidelines for ideas in environmental activities and programming. In addition, the Gould League produces the E Kids Magazine designed to educate children about the environment. These publications are given free to schools.

NATIONAL CONFERENCE OF GOULD LEAGUES

Realizing that there were other Gould League organizations working independently in Victoria and Western Australia, the Gould League of New South Wales organized the first national conference of Gould Leagues in Sydney, in 1976, where New South Wales, Victoria, Western Australia, South Australia and Queensland were represented. Each year since 1976 these annual conferences have continued and have done much to unite and coordinate the work of the Gould Leagues throughout Australia. These conferences contributed to the eventual formation of the Australian Association for Environmental Education.

CELEBRATION OF SPECIAL DAYS

In order to bring teachers' and children's attention to specific environmental events, a number of special days are celebrated throughout the year. These celebrations are Arbor Day, Wattle Day, Earth Week, Bird Month and Bird Day. In connection with Bird Day, the Gould League conducts an Operation Birdwatch where children from all over New South Wales count the number of birds and species found in their school grounds. This information is returned to the Gould League office where it is collated and the results printed on maps of NSW.

ENVIRONMENT AWARDS

Annually the Gould League presents environment awards to New South Wales schools for worthwhile projects completed by children in schools on any aspect of the environment or environmental education. The award takes the form of a plaque, suitably engraved.

CAYLEY MEMORIAL SCHOLARSHIP

In memory of the ornithologist Neville Cayley who wrote the famous Australian book entitled "What Bird Is That," the Gould League offers an annual Cayley Memorial Scholarship for an approved project or undertaking, designed to promote wildlife management particularly in relation to bird life.

PROMOTING FIELD STUDIES CENTERS

The League helped to establish the field studies center at Wirrimbirra, Bargo south of Sydney with the donation of a large sum of money to build the "J.E. Roberts Memorial Classroom." It also donated a large sum of money to pay for the erection of a classroom at Longneck Lagoon Reserve so that the site could be established as the Longneck Lagoon Field Studies Centre. This centre is on the edge of Sydney's western suburbs. Children from all over New South Wales raised money to fence the whole of Longneck Lagoon area. This was a positive way to involve children in environmental education.

INTRODUCTION OF ENVIRONMENTAL EDUCATION IDEAS FROM THE UNITED STATES

During 1980 the Gould League hosted Duane Toomsen, Environmental Education Consultant for Iowa, in New South Wales to conduct a series of environmental education inservice workshops. A similar hosting occurred in 1981 with Joseph Cornell of "Sharing Nature With Children" fame. Both of these people greatly assisted large numbers of teachers with the latest ideas and trends in environmental education in the United States. This input helped many teachers to develop their own programs and ideas for use at the local school and district level.

GOULD LEAGUE HEADQUARTERS AND PRESENT INPUT

The Gould League has established its own office, display area, library and conference area as an environmental centre in the grounds of Beecroft Primary School in Sydney. It distributes and sells the latest resource material and publications and is acknowledged as the leader in promoting environmental education in schools. The centre has established agencies throughout NSW to promote its materials, whilst at the centre itself a demonstration native garden has been created for school use.

Annually a competition is conducted by the Gould League. In 1982 the topic was the "Year of the Tree." This theme was celebrated throughout Australia as the first year of a 10-year greening program. The standard of entries was extremely high, incorporating contributions from kindergarten to year 12 students and covering a wide scope of media. The theme for 1982 is centered around "Our Endangered Species."

The growth of environmental education is considered so important that each Education Region throughout NSW has been asked by the Department of Education to form its own environmental education committee, under the chairpersonship of a District Inspector. These committees are formed by the selection of teachers with outstanding expertise in environmental education and naturally many of these people are Gould League coordinators. The committees cater to the special needs of their own area. During 1982, some have created suitable resources, printed news sheets and have led inservice courses. All regions and activities are assisted by the Environmental Education Consultant/Gould League and ideas and expertise are exchanged at their combined conference.

The Gould League has come a long way in 72 years. Edward Webster and Walter Finigan, its originators, would no doubt be very excited with the progress that the League has made in introducing environmental education to many people. Indeed, environmental education has not been taught but rather caught. Environmental education has shown teachers and children that they must have a stewardship approach to the managing of the spaceship earth, which they depend on for their very existence.

ENVIRONMENTAL EDUCATION PROGRAMME BARBADOS, 1975-1981

by Jill Sheppard*

From the very start the Environmental Education Programme initiated in Barbados in 1975 by the Caribbean Conservation Association (CCA) was considered as providing an additional input into the educational programme; at no time was 'environmental education' considered to be a subject in its own right. It was regarded, as the Ministry of Education said at that time, as being part of an 'enrichment' process and not part of the curriculum. This was not to say that there should not eventually be environmental education elements incorporated into the curriculum; this would, however, be a long-term process which could for the present only be initiated and not completed. In fact the statement made by Dr. Victor Johnson, in a recent issue of Mazingira that "Environmental Education should not be considered as a discipline like Physics or Biology, but as a dimension which encompasses all disciplines" was a principle which was always accepted, without realizing that it was, in fact, an important principle.

Another feature was that Environmental Education was not regarded as having any particular mystique. There was no time to be wasted, and while textbooks and modules and audiovisual aids relating to the region, of which there were very few, were highly desirable, the CCA had neither the time nor the expertise nor the funding to engage in their production; though this was to prove possible, to a limited extent, at a later stage. It reckoned that its function was to do something, and do something quickly, to make information on various aspects of the environment available to the community. It saw itself as a catalyst, bringing together those with the required information and those who needed to have that information. The secret, of course, was how best to achieve this interaction and CCA does not claim by any means to have found the perfect answer.

A further feature was that this programme was initiated without any funding. Again, the matter was considered to be so urgent and important that there was no question of sitting back and waiting for funds to become available. Indeed, had it done so, the CCA would have waited a very long time. To this day the CCA has received no funding for its Environmental Education Programme, except for the environmental education component of its Eastern Caribbean Natural Area Management Programme (ECNAMP), which is not considered in this "case study." It is true that the CCA had a Secretariat, consisting in the early days of an Executive Director and a part-time typist, with paper, stamps and a telephone, but this is no more than many organizations have. It had, however, a sense of urgency.

It may be of interest to other organizations to know how it was that the CCA managed to initiate and carry out its Environmental Education Programme, and what it consisted of, and how it was that it eventually

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reached the point of being considered seriously by international organizations such as the United Nations Environmental Programme (UNEP) and the International Union for Conservation of Nature and Natural Resources (IUCN) and now has a full-time environmental education officer provided for it by the Commonwealth Fund for Technical Cooperation (CFTC). The pattern it followed was a simple one, and one which can be followed anywhere. It seems, however, to be worth outlining this for the benefit of others since, even in the English-speaking Caribbean, there has been little success in organizing similar programmes.

Initially the CCA set up a small committee consisting of representatives of the Ministry of Education, the University, the National Trust, and of individuals interested in environmental matters, to give advice on how an environmental education programme might best be organized. It was decided to start with the secondary schools, and try to find some means of arranging series of talks by persons in the community with a specialized knowledge of environmental matters. Several talks were first arranged at a central venue in the capital, Bridgetown: the schools were circularized, the press informed, but very few students turned up. The teachers, it seemed, were to a large extent to blame, in that they had not passed the information on to their pupils. In addition, it seemed necessary to take the speakers to the schools, rather than the schools to the speakers.

At the same time as plans were being made to arrange for a decentralized programme (the island of Barbados is only 24 by 14 miles so this was not a serious problem), a number of experiments were made with vacation projects of various types. During one summer vacation three such projects were organized: a botanical project run by a science master at one of the secondary schools, a beaches project organized by the Parks and Beaches Commission, and an oral history project arranged by the Commonwealth Caribbean Resource Centre (COMCARC). Of these the only one that was in any way a success was the last; this was due mainly to the fact that the project was directly related to COMCARC's own interests, and therefore it was prepared to spend time and energy on it. The other two failed owing in part to the too complicated nature of the projects, and in part to the lack of supervision which the science master and the Parks and Beaches Commission were able to provide. Another botanical project organized the next year was a success only to the extent that a particular science teacher was interested. This experience tended to confirm suspicions the CCA had had for some time that it should have started its Environmental Education Programme with the teachers rather than with secondary school pupils; that, however, would have involved workshops and the like, for which funding would have been necessary and the decision was made to continue with the programme for secondary school pupils, hoping that the attempts being made to increase public awareness of environmental matters generally would gradually have some effect on the teachers.

The years 1978-1982 therefore saw the CCA concentrating on the provision of speakers for secondary schools, and the pattern, in view largely of the lack of time available to the Secretariat remained very much the same.

There is at present a panel of 39 speakers available to go around and talk to secondary schools, at their request. The speakers are all experts in their own particular subjects, and comprise university lecturers, civil servants, and others with expertise in planning, architecture, forestry, energy, public health, marine biology, meteorology and other subjects. A list of those available is circulated by CCA at the beginning of each academic year; a letter is sent out by the Ministry of Education expressing its support for the programme; the schools then telephone the CCA Secretariat with their requests for speakers to make a contribution in their various programmes.

The range of topics is as varied as the range of disciplines from which speakers are drawn so that "environment" covers the natural as well as the social and cultural environment.

Examples of topics covered by our panel of speakers are:

(a) EFFECTIVE WASTE MANAGEMENT AND ITS RELEVANCE TO THE ENVIRONMENT

This follows the theme of effective waste management involving the control of discarded objects, materials, etc. from the time they leave the domestic house, commercial establishment or industry, through handling to their ultimate disposal, whether by sanitary landfills, incineration or pulverization.

(b) THE SHAPING OF THE ENVIRONMENT BY HISTORICAL EVENTS

An account of the effect that history has had on our lives, with particular reference to the development of villages in Barbados.

(c) THE IMPORTANCE OF PHYSICAL PLANNING IN PRESERVING THE ENVIRONMENT

An aspect of this is the need to ensure that adequate attention is paid to social and cultural facilities, since such considerations would not normally receive adequate attention in a market economy. Positive attention to such matters could however make a vital contribution to the development process.

(d) CARIBBEAN ENGLISH AS PART OF OUR CULTURAL HERITAGE

This topic highlights the clear distinction which should be made between dialect at the folk level and the idiom of the English of educated West Indians--insofar as the latter differs from internationally accepted standard English. The lecturer makes the assertion that these differences are many more than we suspect and poses the question. "Should we abandon or preserve them?"

None of the speakers receives any remuneration whatever. Although regarded mainly as speakers in this particular programme, this group however also provides a valuable fund of resource persons, kept informed through the quarterly 'Caribbean Conservation News' of the Association's activities, which can be drawn on for panel discussions, radio and television programmes and the like.

While this programme provided the main thrust of the CCA's activities until early 1982 it was not the only kind of public awareness activity carried out. The CCA has from the start used what opportunities it could in getting the 'environmental message' across to the public, whether by articles in the press, arranging for interviews of visiting environmentalists on radio and television, and the like. This, again, is not a matter of funding, but of making use of the resources that are available. Fortunately, in Barbados there are many persons available who are prepared to assist the Caribbean Conservation Association by providing their services in what they consider to be a good cause. Without them the CCA could not have reached the point it now has of moving into a much wider range, both organizationally and geographically, of activities related to environmental education.

PROVIDING ENVIRONMENTAL EDUCATION SUPPORT TO SCHOOLS IN REMOTE AREAS OF AUSTRALIA

by Bob Stevenson,* Dr. James Richmond,** and Lee Williams***

INTRODUCTION

During the early 1970s in Australia there was an increase in teachers' recognition of the value of using the outdoors for educational purposes. Despite this recognition, however, many teachers remained reluctant to involve their students in field studies outside the classroom.

Within the State Department of Education in Queensland there was considerable concern to try to rectify this situation. An attack on the problem began by hypothesizing the reasons for teachers' reluctance to use the outdoors. The reasons advanced were:

--a lack of knowledge of the local environment surrounding the school;

--a perceived lack of expertise in conducting field studies; and

--a lack of understanding of the kinds of outdoor learning experiences that might be structured for students.

To overcome the last two constraints and to increase the opportunities for students to gain field experiences, it was decided to establish a network of field study centres throughout the state with facilities for providing programs of one to three days' duration. Each of the 11 centres established to date are staffed by two teachers with skills in field study techniques in particular, and environmental education in general. Thus a visit to one of these centres provides teachers who lack the necessary confidence and expertise with the opportunity to observe how field activities may be structured in a variety of environments, while participating with their students in the learning experiences offered.

The development of these field study centres, however, did not meet the needs of two groups of teachers and students. Owing to the scheduling problems and time requirements of the subject-based curriculum, secondary schools were much less willing or able to make use of their regional centres, while for both primary and secondary schools in remote areas of the state, travel to fixed facilities was both time-consuming and expensive.

An appreciation of the dimensions of this latter problem can be gained from a brief description of the area and population distribution of Queensland. The state comprises 1,727,000 sq. km., or 22.5 percent of the land area of Australia, with a distance from north to south of 2,100

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km. and from east to west of 1,450 km. Approximately two-thirds of its population of nearly two and a quarter million resides in the southeast corner of the state, where the capital city (Brisbane) and central administration of the Department of Education are located. The majority of the remaining population live in provincial cities and towns along the eastern coastline. By contrast, the southwest region has a population of only about 29,000 people.

The educational constraints on the use of the outdoors that have already been mentioned were exacerbated in the remote areas of the state by the inexperience of teachers appointed to schools in these areas, a high turnover of staff, and a lack of documentation within schools of the local environment and its resources.

Alternative support for fostering environmental education in schools in the remote areas of Queensland and in secondary schools in general took the form of two specially conceived projects. The first was initiated in 1974 by Alan Clayton of the Curriculum Branch of the Department of Education and involved the establishment of an Environmental Advisory Team of four specialists to visit all secondary schools, beginning with those located in remote areas. The second originated a year later with Merv Stevenson of the Agricultural Project Club Branch and called for the setting up of a Mobile Field Study Unit to serve the remote southwest region of Queensland. A description of each of these projects is presented in the remainder of this paper.

ENVIRONMENTAL ADVISORY TEAM

The Environmental Advisory Team was established at the beginning of 1975 with funding from the Australian Government's Schools Commission. The team consisted of four teachers whose task was to:

> "establish contact with and assist teachers in the school situation;
>
> investigate, survey and research the area around the high schools in order to provide a resource bank of technical data and information which would assist teachers to utilize the local environment as an addition to and extensions of the classroom; and
>
> prepare and publish materials and teaching aids which would provide teachers with a basis upon which further investigation of the resources, materials and study sites available in their local area could be carried out." (Skidmore, 1980.)

The team's schedule was organized so that the remote western and far northern regions of the state would be visited first, followed by the northern then central coastal regions, with the southeastern sector being reserved as the last to receive assistance. In all, 58 localities throughout Queensland were surveyed, resulting in individual reports being prepared for each of these locations.

The initial background research on each area to be visited was undertaken in Brisbane before the team set out on the road. The method of travel was by two panel-vans, later replaced by station wagons, with a caravan and mobile van in tow. Upon arrival at a school the mobile van was established as a resource display centre for teachers, and a scientific and photographic laboratory for the team. After a formal introduction and explanation of the team's function, teachers were asked to nominate local areas for which a resource base of field and technical data would facilitate their utilization for field studies. Such areas usually were confined to a radius of 30 km. from the school.

Armed with a list of 5 to 20 different locations, a preliminary survey of the local area was undertaken. Traveling together, or in pairs if the potential locations were dispersed widely, team members quickly assessed if the site was suitable for a more detailed survey. Frequently teachers were invited "to accompany team members on their surveys so that they could observe techniques and participate in recording and interpretation of technical data" (Skidmore, 1980).

Criteria for selection of a site as a study area included factors such as diversity of vegetation and topology, presence of a particular feature (e.g., a freshwater stream or pond, an historical building), visibility of geological details, resilience for withstanding repeated usage, potential for cross-disciplinary studies or for a course within a school's curriculum (e.g., earth science, biology), accessibility, and safety. Generally, five study areas were selected for inclusion in the reports prepared for each school. One of the study areas was chosen specifically for its potential as a multi-disciplinary site, while three others were selected on the basis of their appropriateness to a particular discipline or subject. The final area usually was a description of the school grounds or a group of minor sites which did not justify a detailed individual survey.

The description of these study areas included methods of using them within the school curriculum, covering as many disciplines as possible. This necessitated team members learning about subjects outside their fields of expertise, such as creative writing, rock climbing and orienteering.

In addition to the "study area" section, a general report was compiled on the town or city in which the school was located. This section presented an overview of the area, including a brief outline of the geology, soils, vegetation, climate, history and land use of the urban area and surrounding shire.

Two other sections, which remained constant for all schools, constituted the rest of the Environmental Reports for Schools. These sections were:

(i) "Study Techniques," which provided basic descriptions and ideas of methodologies for undertaking field studies in different types of habitats; and

(ii) "Resources and References," which listed relevant government and commercial resources pertaining to field techniques.

The operations of the Environmental Advisory Team were terminated in 1978 owing to budgetary constraints. Although the central coastal and southeastern regions of the state were never surveyed, a total of 58 separate Environmental Reports for Schools were published.

MOBILE FIELD STUDY UNIT

The Mobile Field Study Unit was established to provide environmental education experiences for children in the remote southwestern area of Queensland. This region represents some 19 percent of the total area of Queensland but contains only 1.3 percent of the population, including about 5,000 students in 36 schools. This program was directed mainly at the primary school level, with the emphasis being on conducting field trips for children while at the same time demonstrating outdoor activities and techniques to their teachers.

In preparing a detailed submission for the establishment of a mobile unit, Stevenson argued that:

> "Existing Field Study Centres and others being planned cater for the more densely population coastal plain and hinterland fringes of Queensland.
>
> "....The very remoteness of inland Queensland precludes the establishment of viable fixed centres because of excessive transport costs. Therefore, this proposed Mobile Field Study Centre will be designed to assist teachers and students in remote areas to use the potentialities of their areas for environmental education needs" (Fowler, 1981).

In this attempt to establish equality of opportunity in environmental education for country children, the proposal was in clear accord with the stated policies of the Australian Government's Schools Commission and the proposal was subsequently funded under that body's Disadvantaged Country Areas Program.

The original proposal contained a detailed statement of both long- and short-term objectives. The long-term objectives were concerned with broad environmental education goals, while the short-term objectives for the unit were:

(1) To provide a mobile base for day and overnight excursions in environmental studies for schools in....the southwestern region.

(2) To foster, by providing better facilities, interest in field studies in the local area.

(3) To offer an integrated, multi-discipline program of instruction, and activities suited to the environments used.

(4) To develop field skills through activities in the local environment and to develop social and physical skills through adventure and challenge.

(5) To promote the development of local field studies by encouraging projects in nature trails, environmental areas, research usage, habitat studies, and environmental problem solving." (Fowler, 1981.)

The Mobile Field Study Unit consists of a headquarters caravan and a storage trailer, each towed by a four-wheel drive Landcruiser. The front half of the van is used for staff conferences and workshops, while the rear section is equipped with gas refrigerators for food storage, a workbench, a sink and storage cupboards. A caravan annex provides a multi-purpose covered area for use in the event of inclement weather. The trailer is partitioned to carry tents and other camping gear.

The unit has been supplied with an extensive range of educational, camping, and general equipment. The education equipment includes tape recorders, cameras, binoculars, hand lenses, compasses, specimen nets, an astronomical telescope, a microscope, a selection of other scientific equipment, and a library of reference books and resource materials. Camping equipment includes a portable generator, gas barbeques, gas lights, first aid kits, portable toilets, axes, mattocks, spades, portable wash basins, air beds, bed stretchers, and sufficient tents to accommodate visiting schools as well as unit staff.

The current staff on the Mobile Field Study Unit consists of two teachers and a support officer. Staff members have usually been young and have been chosen not only on their qualifications and experience, but also for their enthusiasm and interest in environmental education. The unit support officer's responsibilities include the maintenance and repair of equipment, assisting with establishment and dismantling activities at each campsite, and the ordering, transport and delivery of stores. During school camps he performs a variety of duties such as assisting with the cooking and other camping arrangements as well as fulfilling the role of teacher aide when appropriate.

The unit travels over 2,000 kilometres every month and caters for one or two schools each week. Actual camps are usually of two or three days' duration with the overnight camping experience being a valuable part of the program. Campsites are chosen on their proximity to the school as well as on their suitability as a study area. The Mobile Field Study Unit moves its regional base to a different part of the southwest region each term.

A diversity of programs is offered, including biological and geological studies, outdoor activities (canoeing, bushcraft, orienteering), initiative exercises, habitat studies, creative pursuits, and outdoor mathematics. The actual activities undertaken at a camp are negotiated between the staff of the unit and the teachers involved. Pre-visits are made to schools prior to camps to finalize programs.

EVALUATION OF PROJECTS

An informal evaluation was conducted of the work of the Environmental Advisory Team in 1976, and a formal evaluation of the Mobile Field Study Unit was carried out during 1980. A common finding of these evaluations was their effect in stimulating the interest of teachers in using their local environment:

> "Over 50 percent of visiting teachers considered that the M.F.S.U. programs had inspired them to use the environment more in their teaching" (Fowler, 1981), and the Environmental Reports for Schools "assisted in arousing the interest of teachers in local environmental studies" (Skidmore, 1980).

The originally identified teacher needs, as described in the introduction, were supported by requests for expanding the material on methods for conducting field activities in the Environmental Reports for Schools. These requests resulted in the separate publication of the "Study Techniques" section. This section and the information on the local community and its historical and biophysical environment were rated of immediate use to newly arrived teachers. Similarly, in schools where teachers found it difficult to locate relevant resource materials, the "Resources and References" section was accorded special commendation. Such comments, however, represented a limited response from schools to an appeal for feedback. Nevertheless, numerous requests for copies of reports and for assistance to schools provide some indication of the perceived value of this unique approach to supporting environmental education in secondary schools.

A major problem with the Environmental Advisory Team project was the considerable time lag which eventuated between the school visit and the arrival of the printed report. Thus there was no opportunity for team members to reinforce the initial response and enthusiasm shown by teachers.

Fowler (1981) reports that the activities of the Mobile Field Study Unit have been highly rated by teachers and other educators in providing a valuable educational experience for students. Some doubts have been expressed about the adequacy of pre-visit arrangements and it has been suggested that the effectiveness of the unit could be increased by more communication at the pre-visit stage and by greater involvement of participating teachers in the planning process. Yet the unit has been successful in involving all schools in southwest Queensland in field study activities. "This compares favourably with an estimate of 70 to 80 percent for the proportion of schools on the eastern seaboard which make use of field centre facilities" (Fowler 1981). The high level of school involvement does not appear to have adversely affected the programs of the mobile unit, which are very similar to those offered by fixed centres.

Overall, the formal evaluation has suggested that the unit is achieving the short-term objectives envisaged by its originators, with the possible exception of the fifth objective. Although this objective has been elusive to measure, there is a substantial body of opinion that the impact of the mobile unit on the curriculum in schools has been rather limited.

The issues of impact on school curriculum and cost effectiveness remain under review and are likely to stimulate ideas for modifications in the future operation of the Mobile Field Study Unit. Continuing re-evaluation of the unit will be needed to ensure that there is not a return to the previous inequalities that existed in environmental education for children in this remote area of the state.

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THE "AGRICULTURE AS ENVIRONMENTAL SCIENCE (AES)" CURRICULUM

by Abraham Blum* (Israel)

THE NEED FOR CHANGE

When a national Curriculum Centre was established by the Israeli Ministry of Education and Culture in 1966 "Agriculture as Environmental Science (AES)" was one of the first six projects to start work. It integrates different aspects of science, technology and socio-cultural issues and emphasizes the application of scientific methods and principles to agriculture and to environmental problems arising from man's interference with nature. This emphasis should be viewed against the background of the educational situation as it existed in Israel at the time the curriculum project started to develop.

Since the foundation of the State of Israel, nonvocational agriculture has been a regular part of the elementary school curriculum. Its aims were, above all, to educate towards the return to nature, to the soil and to productivity. At the same time the school garden was to serve nature studies. In practice, agriculture, as a school subject, in Israel faced problems similar to those of rural studies in many countries. Often routine work in the garden was not properly balanced by meaningful learning. In many cases the school garden was expected to provide produce and to occupy academically less able students.

During the 1950's and the early 1960's the socio-economic situation in Israel underwent rapid changes towards intensive urbanization and industrialization. Agriculture continues to be the country's most sophisticated area of production. In each agricultural branch, fewer farmers, possessing a high professional standard, produce now higher yields. At the same time, a new wave of immigrants who did not always identify with the agrarian ideals of the early settlers contributed to a decline of the image agriculture had in the urban population. Even among educational decision makers many thought that agriculture might be a good topic for rural regions but not in urban areas.

At the same time the traditional nature studies had come under attack as being too woodsy-birdsy and not scientific enough. As often in education, the remedial action tended to overshoot the target. When BSCS (yellow version), Chem-study and PSSC were introduced, their laboratory-centered approach was not balanced by outdoor investigations. The emphasis was on the structure of the disciplines. Applied and social issues related to science were neglected.

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A NEW APPROACH

When the AES curriculum was being planned, special attention was paid to the needs of the urban population. Rural children did not need to learn in school what modern agriculture is. They could see this at home. But youngsters in the concrete jungles of the cities needed a new approach to plants and animals, which they could find in their vicinity. Therefore, flowers were to play an important role in the curriculum. At the same time flowers had become one of Israel's major export articles and their production was based on an immediate translation of scientific research results into agrotechnical methods. So here was a topic which would show city students how modern and scientific agriculture works. It could also return to science teaching the applied aspects which had been neglected in the previous wave of curriculum change.

The AES project recognized that only a small percentage of the students will become agricultural producers, but all of them are already consumers of agricultural products. Therefore another criterion for choosing topics was set up: relevance to both producers and consumers. This became the basic philosophy mainly in units on the DDT controversy, food spoilage, the world hunger problem and others.

Although in the past agriculture has been classified by the Ministry of Education as 'training subject,' it was considered in the Curriculum Centre as part of the natural sciences. At that stage an amalgamation of agriculture and science was deemed desirable but not feasible, mainly because of the existence of two separate inspectorates in these two subjects But planning the AES programmes was coordinated with that of the other science curricula and the director of the AES project, Dr. Abraham Blum, became the first coordinator of the Science and Technology Section of the Curriculum Centre. With the gradual and successful introduction of AES units into the majority of schools in which agriculture is taught, the Ministry of Education and Culture decided to change the name of the school subject to Environmental Studies and Agriculture.

SOCIO-CULTURAL ISSUES

The AES project does not believe that environmental education and science teaching can or should be culture-free and uninvolved in social issues. Therefore from the beginning an effort was made not only to include in the texts contemporary and controversial social and environmental issues, but also to show how the cultural heritage contributed to developments in science and technology.

Many important discoveries, clever inventions and useful, environmentally sound agricultural practices were developed 2,000 years ago by our forefathers through observation and experience. The experimental approach is more fruitful and enables man to answer also why-questions, which experience cannot do. Scientific and technological progress, but also environmental mismanagement, grew at an exponential rate. But we look with respect and even admiration at some of the achievements of our ancestors. They used artificial pollination 2,000 years ago and knew the cycles of nature quite well.

In Israel parents can choose which of four school systems they wish to send their children: Hebrew General or Religious, Arabic or Druze. The AES materials which were written in Hebrew and are used in both the religious and the general school systems, comprise quotations from the Bible, the Talmud and other Jewish cultural sources. The Teacher's Guides also include special selections for teachers in religious schools. Towards the last Sabbatical Year a special pamphlet published advice on how to implement the AES project in accordance with religious traditions.

About 1968 the first units of the AES project were translated and adapted for the special needs of Arab and Druze schools; this was the first inquiry-type science curriculum to be published and implemented statewide in Arabic. Therefore, a special effort was put into the trial of the first Arabic version. The analysis of the feedback showed the need for the following changes, which were then introduced into the texts:

1. Plant names, biological and technical terms which sometimes differ according to regional idioms and usages were standardized or synonyms were explained.

2. Quotations from Arab literature and examples of positive practices, taken from the folklore. were introduced instead of the quotations from the Talmud.

3. Story-type passages which had a smallholders' cooperative background were adapted to the social and cultural atmosphere of the Arab village.

4. After a survey conducted in Arab schools had shown that pupils preferred photos and drawings of children and farmers which were close to their own ethnic background, some of the illustrations in the Arab student text were exchanged. While the specific cultural background with which pupils identify was emphasized in each of the two versions, some of the passages which described ethno-cultural traditions of Jew and Arabs were included in both texts.

THE UNITS

The written materials are usually published in Hebrew and Arabic. Some units (marked *) were partially or fully translated into English, but not published. All units are based on students' texts and teacher's guides. Where additional materials have been developed, these are mentioned in parentheses.

For Grade 6: Seeds germinate; be host to plants in your home; the flowering corner (also work-cards); the voice of the turtledove is heard in our land;

For Grade 7: Let's grow plants (also background materials for teachers, catalogue of materials and equipment, and blueprints for the planning of land laboratories); the fruit fly and the DDT problem; uncalled-for guests (also a definer for weed seedlings and slides); on moulds and mildews and other fungi (also Life Cycle of Fungi learning game); catalogue of materials and equipment needed and background materials for teachers--for the whole Let's Protect Plants series.

For Grades 8-9 (other topics): Fight against hunger (also workcards, readers, End to hunger--a simulation game); Let's keep bees (also worksheet for approximation of bee brood area, four filmloops); Let's raise chicks (also slides and reader on the development of the human embryo).

SYNOPSIS OF SOME TYPICAL UNITS

The Flowering Corner

The aim of this unit is to develop and foster pupils' awareness of the aesthetic value of plants on the school ground and in the neighbourhood. Students are involved in activities which contribute to the beautification of the school and its surroundings. This is done mainly by developing at least a corner in which plants flower during most of the school year. Students learn to choose a suitable spot, how to prepare the seedbed and the plants. Special attention is given to planning such a corner--first on the school ground and then at home.

Be A Host to Plants in Your Home

This unit goes one step further. Pupils learn in an open-ended way how to grow and keep potted plants in their home. Special attention has been given to the illustration of the students' text in order to motivate students. Each of them receives two potted plants to keep at different places in their homes. Students observe the differences in the development of their plants and bring them back to school, once or twice during the school year, to compare them with those of their classmates and to discuss how to improve the results. The emphasis is on the development of a do-it-yourself approach.

The Fruit Fly and DDT Problem

The pollution of food and the human body by pesticide residues is one of the ecological issues which should worry mankind. It is one of the problems arising from man's interference in nature which cannot be solved by an hysterical cry for an extreme measure--the banning of all insecticides, an action which would result in the death sentence for millions of people, endangering these by insect-borne diseases and the shortage of food. Rather, an integrated plan of action should be adopted, based on a careful reappraisal of scientific research and technological progress, weighing the pros and cons of each possible action. To be able to do so, citizens need to be trained in the understanding of complex problems which can be solved only when civic action is taken on the basis of comprehending the underlying scientific issues.

The "Fruit Fly and DDT Problem" unit was built around a case study starting with a major economic problem--the damage caused by the Mediterranean Fruit Fly. This problem was chosen because the Mediterranean Fruit Fly is considered as one of the most serious pests of citrus and other fruits in Israel and many other countries. The chapter headings, experiments and main topics are as follows:

1. Woe for the yield. The damage done to food since early times, as described dramatically in the Bible, the Prophet Joel on the locust opens the unit. Also today, pests can still damage up to an estimated 40 percent loss in developing countries.

2. The rise and fall of DDT. The importance of agricultural export for the country's economy, especially of citrus fruit, is stressed in the text. After the students become familiar with the fruit fly and the damage it causes, they become interested in control. This presents the opportunity to introduce DDT, which was used against the Mediterranean Fruit Fly, in an historical aspect. The students' text describes the discovery of DDT, its immediate, revolutionary impact on both military and civilian use. DDT kills the Mediterranean Fruit Fly, but its wide range of action is dangerous to predators, fruit fly parasites, farm animals and others, which were, until then, stable in the biological equilibrium. Students investigate experimentally how the fruit fly and two of its natural enemies, the house fly, the honey bee and fish in the acquarium are affected by DDT. They find that these are all killed by DDT, with the unexpected exception of the house fly, which has developed resistance to DDT. The need for a better solution of the fruit fly problem is established.

3. More insecticides and more problems. This chapter describes the trend in chemical pest control to find more effective and more selective agents. The aims are often contradictory: on the one hand, we are interested in long-range protection, on the other, in quick disintegration of pesticides. Insects develop resistance, even against very powerful and dangerous poisons such as organic phosphates. There is no ideal insecticide. New ways have to be found.

4. Biological control. The idea of biological control is introduced through the historical example of Icerya controlling Novius cardinalis, an example which also features international cooperation. The experimental part of this chapter brings students to the forefront of research in biological control. The effectiveness of two insects, imported from Hawaii, as possible predators of the Mediterranean Fruit Fly, is investigated by students in an effort parallel to the research done in the Biological Control Institute of the Citrus Marketing Board, which also cooperates in the distribution of insects to schools.

5. Using bait as selective control. While biological control against the Mediterranean Fruit Fly is not yet feasible on a commercial scale, and may never be a complete solution, other ways are being investigated. The method presently favoured in Israel is the use of poisoned bait, which attracts the fly selectively. Students discover that some hormonal materials attract only males or females, and they discuss the possible use of these powerful attractants.

6. Pest control by the irradiation of males. Although the male fruit flies are grown and irradiated in Israel for the FAO, this method is discussed only briefly, because under present conditions it cannot give positive results in Israel and no experiments with radio-isotopes can be performed in junior high schools.

7. Who exaggerates? This chapter stresses the public controversy aspect of the insecticide problem. Students, having studied the various effects of DDT, are now confronted with two one-sided presentations of the insecticide problem--a passage from Rachel Carson's "Silent Spring," and the answer to this passage given by a representative of the United States Department of Agriculture in a congressional committee meeting. A series of questions helps the students in the analysis of the text and leads them to the discovery that both sides use propaganda methods as a measure in their efforts to persuade the public of the verity of their side.

Fight Against Hunger

The student text starts with a dramatic story of hungry Jasmin living in the shadow of a palace. Then different types of hunger such as lack of calories and malnutrition due to an unbalanced diet are discussed.

In the second chapter the question "Is the danger of hunger imminent?" is asked. Conflicting opinions of different experts are cited and students try to understand the often unconscious motives that influence people when forming opinions.

In Chapter 3, students learn about the vicious circle, Hunger-Weakness-Illness-Ignorance-Apathy-Economic Backwardness-Poverty-Hunger, and are asked: "How can the vicious circle be broken?"

"What can be done to alleviate the problem of hunger?" is the question posed in Chapter 4. Students are referred to various resource materials, where they will find suggestions for unconventional ways to wage the war against hunger. Groups of students are then directed to the project cards and to the readers, which will help them to understand the complexity of each solution proposed, and the difficulties which arise when the ideas, so neat in theory, are actually implemented

The last two chapters are on plant and animal breeding as one of the most promising ways to increase yields. Plant breeding was the starting point of the "Green Revolution." Basic concepts such as variety and breed, selection, hybridization are explained and students engage in various field experiments.

The simulation game "End to Hunger" serves as a culminating activity and summary for the topic "Economic Development and International Cooperation." Each student represents a wealthy or developing country. There are many factors, besides the efforts invested into work, that influence a country's chances to obtain food for an ever-expanding population. Among them are both natural and social elements. Students are led to discover that cooperation and education can benefit all of them and is essential for progress.

IMPLEMENTATION

Diffusion

According to the estimates of the Inspectorate on Agricultural and Environmental Studies, AES programmes are used (1978):

in 6th grade by 14,500 students (420 schools)
in 7th grade by 18,000 students (510 schools)
in 8th-9th grade by 5,000 students (150 schools)

No data are available on the dissemination of AES materials in secondary schools which use them in their biology courses. Some of the 8-9 grade materials are now also included in the new environmental studies course planned for senior high schools.

In-service Training

Every year, during the summer vacations, special courses are offered for teachers who intend to use AES materials. These courses last one or two weeks and are residential. Separate courses were developed for different AES curricula. Teachers pay a nominal fee towards their subsistence, but the courses are subsidized by the Ministry of Education and Culture. Teachers who attend courses for about four years receive a salary increase.

Advanced courses are organized for teachers with experience in the use of AES materials. Shorter courses on single topics are given from time to time by various institutions.

Supply of Equipment and Living Organisms

When a school decides to teach AES curricula and the teacher has attended the appropriate course, the Inspectorate on Agriculture and Environmental Studies supplies the necessary equipment. Living organisms are grown, or collected. and then distributed by a national supply centre at the Kfar Hayarok Agricultural School. Teachers receive these materials either directly or through regional distribution centres and school farms.

EVALUATION

Formative evaluation was based on teacher reports given at monthly meetings of trial teachers, analysis of teachers' written reports and on students' work which was collected by the trial teachers who had received advice on how to choose the sample. Trial classes were also visited by members of the follow-up team.

Evaluation instruments included diagnostic multiple choice achievement tests, questionnaires on interests and attitudes, students' preference scales for various activities (over a week and over a year) and teachers' attitudes towards various characteristics of the programme.

Special attention was given to pupils' reactions to drawings in their text and to the evaluation of a learning game.

When the "Let's Grow Plants" programme was adopted by about half the country's schools which offer environmental studies and agriculture, a comprehensive study on the effect of the programme on student achievement, mainly in applying the rules of experimental design to field experiments and on affective learning was undertaken. When compared to pretests and to suitable control groups, AES students showed very significantimprovements in drawing conclusions from experiments and in appraising critically experiment designs. They also found their students engaged in more useful leisure-time actiities involving reading about, observing, experimenting with, and growing, plants.

ENVIRONMENTAL SCIENCE: A NATIONAL PROGRAMME FOR PRIMARY SCHOOLS IN ZIMBABWE

by Sylvia Parker* and David Witt**

A working party was formed in 1978 to develop an Environmental Science syllabus for primary schools in Zimbabwe. The core of its terms of reference stated that:

> ... through the course the child must appreciate his dependence upon the environment, identify those elements that contribute to its well-being and begin to accept responsibility for their conservation and improvement.

This was the exhilarating challenge that faced the whole working party up to April 1980 and its leader up to August 1980. The challenge was enhanced by the fact that, during the same period, the country underwent predicted radical political changes. This meant that the syllabus would be one of the first to be developed not only for all schools in Zimbabwe but also for racially integrated schools.

Background

In 1974 a visiting committee recommended that geography, history, science and gardening, which existed as separate subjects, should be reviewed and realigned as Environmental Studies. The committee identified two branches of Environmental Studies, the physical environment and the social environment. A national committee, after considering the total integration of the subject areas mentioned and after drafting outlines for this, decided that a more manageable arrangement was to start by developing separate programmes for environmental science and for social studies. The developers of these programmes would be in close touch with each other but the integration of the programmes would be a longer-term target. This account deals with the environmental science syllabus and materials and with changes that have been made since August 1980.

It is interesting to note that the composition of the environmental science working party represented the first time that curriculum developers from both the Ministry and the University had joined forces on a national curriculum development project in Zimbabwe.

The Syllabus

A 'wheel' summarizing the topics in the syllabus is provided in Figure 1. Grade 1 topics are shown in the innermost circle of the wheel and Grade 7 topics in the outermost. Grades 1 and 7 correspond to the first and last year of primary schooling in Zimbabwe. The age range for the seven years is, on average, 7 to 13 years. The 'wedges' between the spokes of the wheel show how topics, in terms of content, are developed.

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Syllabus Summary

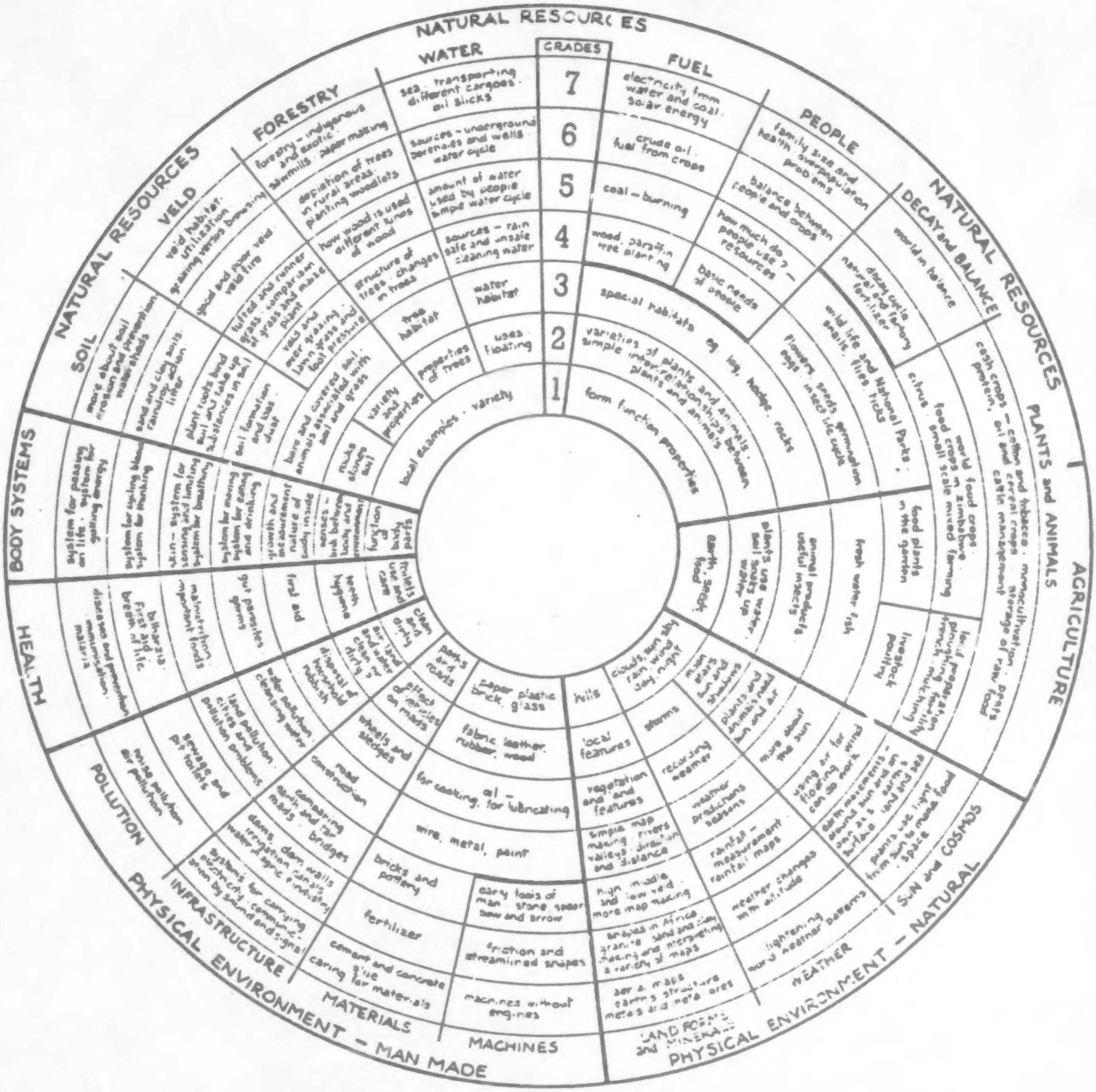

NATURAL RESOURCES
GRADES
7
6
5
4
3
2
1
FUEL
electricity from water and coal. solar energy
crude oil. fuel from crops
coal – burning
wood, paraffin tree planting
special habitats eg. log, hedge, rocks
varieties of plants and animals. simple inter-relationships between plants and animals
form function properties
PEOPLE
family size and health. overpopulation problems
balance between people and crops
how much do people use? – resources
basic needs of people
NATURAL RESOURCES
DECAY and BALANCE
world in balance
decay cycle natural and factory fertilizer
wild life and National Parks; snails, flies, ticks
flowers, seeds germination eggs, insect life cycle
AGRICULTURE
PLANTS and ANIMALS
cash crops – cotton and tobacco. monoculture. protein, oil and cereal crops. storage of raw food. cattle management
world food crops. food crops in Zimbabwe. citrus. small scale mixed farming
food plants in the garden
fresh water fish
animal products useful insects
plants use water. soil soaks up water
earth, seeds. food
land preparation ploughing, contour trench, mulching
livestock poultry
PHYSICAL ENVIRONMENT – NATURAL
SUN and COSMOS
plants use light from sun to make food. space
earth movements – around sun and on own axis. earth's surface. land and sea
using air for floating. wind can do work
more about the sun
plants and animals need sun and air
moon, stars. sun and shadows
clouds, sun, sky. rain, wind. day, night
WEATHER
lightening. world weather patterns
weather changes with altitude
rainfall – measurement. rainfall maps
weather predictions seasons
recording weather
storms
LAND FORMS and MINERALS
aerial maps. earth's structure. metals and metal ores
shapes in Africa. granite, sand and clay. making and interpreting a variety of maps
high, middle and low veld. more map making
simple map making. rivers, valleys. direction and distance
vegetation and features
local features
hills
PHYSICAL ENVIRONMENT – MAN MADE
MACHINES
machines without engines
friction and streamlined shapes
early tools of man. stone, spear, bow and arrow
MATERIALS
cement and concrete. glue. caring for materials
fertilizer
bricks and pottery
wire, metal, paint
oil – for cooking, for lubricating
fabric, leather, rubber, wood
paper, plastic, brick, glass
INFRASTRUCTURE
systems for carrying electricity, communication by sound and signal
dams, dam walls. irrigation canals. water in agric. and industry
comparing earth and tar roads. bridges
road construction
wheels and sledges
effect of vehicles on roads
paths and roads
POLLUTION
noise pollution. air pollution
sewage and pit toilets
land pollution. cities and pollution problems
water pollution. cleansing water
disposal of household rubbish
air, land and water. clean and dirty
clean and dirty
HEALTH
diseases and prevention. immunisation. malaria
bilharzia. first aid. breath of life
malnutrition. important foods
gut parasites. germs
first aid
teeth hygiene
toilets use and care
BODY SYSTEMS
system for passing on life. system for getting energy
system for cycling blood. system for thinking
skin – system for sensing and limiting. system for breathing
system for moving. system for eating and drinking
growth and measurement. nature of body inside
senses – link between body and environment
function of body parts
NATURAL RESOURCES
SOIL
more about soil erosion and prevention. watersheds
sand and clay soils. raindrop action. litter
plant roots bind soil and take up substances in soil
soil formation and kinds. dust
bare and covered soil. animals associated with soil and grass
rocks, stones, soil
local examples. variety
VELD
veld habitat. utilization. grazing versus browsing
good and poor veld. veld fire
tufted and runner grass. comparison of grass and maize plant
veld and over grazing. lawn grass and foot pressure
variety and properties
FORESTRY
forestry – indigenous and exotic. sawmills. paper making
depletion of trees in rural areas. planting woodlots
how wood is used. different kinds of wood
structure of trees. changes in trees
tree habitat
properties of trees
WATER
sea. transporting different cargoes. oil slicks
sources – underground. boreholes and wells. water cycle
amount of water used by people. simple water cycle
sources – rain. safe and unsafe. cleaning water
water habitat
uses. floating

Figure 1

Roughly half the syllabus is concerned with natural resources and agriculture. These had hitherto been neglected topics in primary education despite the fact that the majority of schools are situated in rural areas.

Problems of overgrazing, soil erosion and tree depletion were common and were increasing. Peasant farmers and their families did and still do form the bulk of the population. They cultivate small plots to grow crops such as maize and groundnuts. Their cattle share communal grazing land. Water usually has to be collected and transported from dams, rivers and other water points some distance away. The major water sources are usually infected with Bilharzia (Schistosoma) and this continues to be the case despite the efforts that have been made since independence to provide more and safer water supplies by establishing many more boreholes and wells.

Water obviously has a strong link with health. It also has links with rainfall, topography, road building, plant growth, boreholes, dam building, sewerage and evaporation.

The limitation of the wheel in Figure 1 is that, although it shows the development of a topic like 'water,' it does it very superficially and the 'cross-linking' is obscured.

In the Environmental Science syllabus and related materials the environment is seen both as the focus and as the provider of 'equipment' for observation, comparison, model making and investigation. And the need to learn about the environment and develop the skills listed at, if possible, no cost, is a very real consideration. The following are examples of questions raised in the syllabus, of 'no cost' experiments and of topics and concepts introduced because of national need.

Example I

How do the properties of soil change when water is added?

Example II

How do our heavy subtropical raindrops affect bare soil and covered soil?

Example III

How many fertilizer granules are needed to make tomato seeds grow well?

Example IV

How does the amount of heat and light (energy) produced by different burning substances compare? In this investigation pupils use a candle stove and compare the length of time taken for teaspoonfuls of milk powder, sugar, maize meal, etc., to burn.

Example V

Who needs more sugar in their tea, sedentary Mrs. Gopoza or the local football star? This question follows naturally from the investigation into the energy content of various substances as do the topics of nutrition, breast-feeding and prevention of childhood afflictions such as kwasiokor (poor protein diet) and gastroenteritis which all get a high billing in the syllabus.

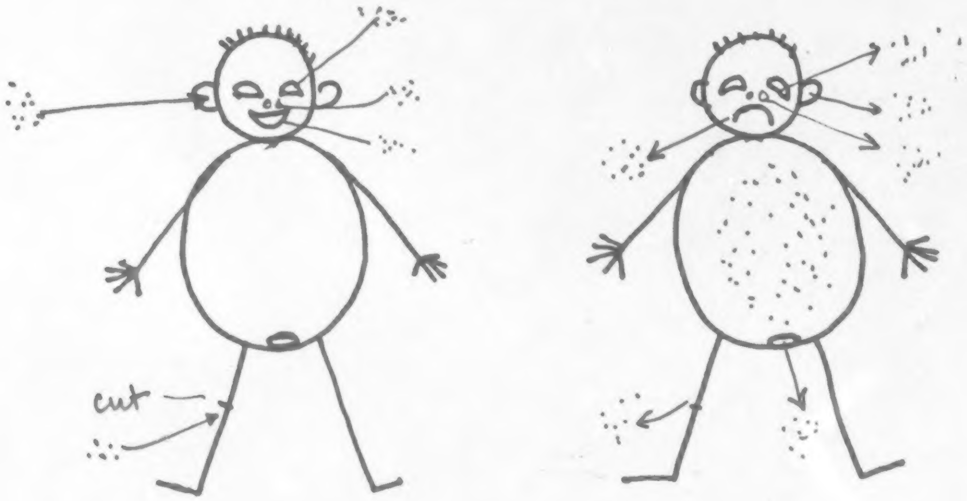
Example VI

'Germs' is a key concept in the understanding of how disease is caused. Without microscope experience can young children grasp this? Trial testing found that Grade 4 pupils (age 9 years) could cope with these ideas:

germs are so small they cannot be seen
germs float in air
germs like warm, moist places
germs make baby germs very quickly

Sieved ash makes a good substitute for germs. It is made up of tiny particles. Ash dust floats and spreads in air as a person coughs. Tummy-stick figures indicate how germs pass into a person's body through places that are warm and moist. They multiply inside and cause disease. Germs pass out of the body of a diseased person in the same way. See Figure 2 below.

Stick Figure Illustrations



Germs pass into the body.

Germs pass out of the body of a diseased person.

Figure 2

Example VII

Another difficult concept is that of immunity through vaccination. Trial material was developed and tested for introducing this in Grade 7. Normally such an abstract concept would be left for the secondary school. However, health workers were insistent that primary schools provide reinforcement for their measles immunization programme.

The following are 'agricultural' examples.

Example VIII

Which mulches preserve soil moisture best?

Example IX

Why plough the soil? Figure 3 shows a simple way of demonstrating the principles of ploughing. A 'field' of soil, which has a layer of white maize meal below a layer of brown soil, is prepared in a tray.

The Nail and Spoon Plough

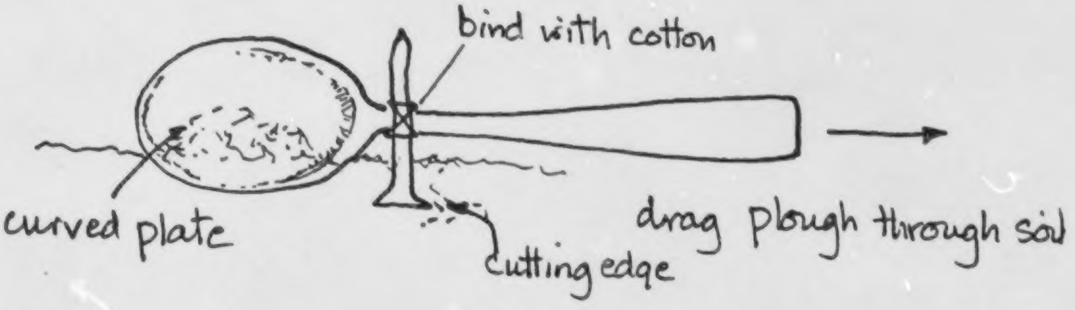


Figure 3

The nail head provides a cutting edge to rip the soil and the 'turning over' action of the curved spoon brings the white layer of the soil to the top.

Example X

Underground water is an important resource in dry stretches of our country. But how can water exist underground? Why doesn't the earth above cave in? Why doesn't the earth get wet? It is suggested that pupils are shown a large bowl which they one-third fill with water. Rocks are added, then smaller and smaller stones. Finally soil is poured on top. It remains firm and dry. Is the water still there? Yes. How could it be raised?

Examples VII, IX and X also serve to illustrate how, in this syllabus, the Science of agriculture was emphasized.

The syllabus was large. But it was not intended that teachers should use it all. They were encouraged to select from it material that was relevant to their particular environment. For example, included for urban people were the topics of flyover bridges, air pollution, hydroelectric power and sewerage. Other sections of the syllabus were specific to rural areas and some were applicable to both. Those sections which were seen as vital were designated as core sections. The intention was, therefore, that in all schools the core sections would be used and then a relevant selection would be made from the rest.

The detailed syllabus document was published and distributed in 1980. Teachers were encouraged to implement the syllabus even without the 'traditional' pupils' and teachers' published texts. Indeed, in the syllabus, teachers were encouraged to use their own ideas to attain the objectives of the syllabus. However, in Zimbabwe, as in most developing countries a large percentage of the teaching force is either unqualified or underqualified. These teachers need clear guidelines, particularly when handling a new subject area. For these, extracts from the manuscripts of the materials to be published were reproduced in a teachers' magazine which is distributed free of charge to all schools in Zimbabwe. The intention was to use the magazine in this way until the published materials appeared. But back to the syllabus document. The document listed and explained major concepts, skills and attitudes in the introduction. An analysis of each concept was provided, e.g.,

particles--'minute portion of matter'

particles are small and discrete
all matter reduces to particles
particles may be visible/invisible
          may dissolve/not dissolve
          are never lost
insoluble particles may be filtered out
soluble particles may be dissolved and transported
particles participate in building up of substances
particles participate in change
particles form basic units in cycles.

This analysis was for the benefit of the teacher. Similar terminology was not intended for pupils. Topics and activities encountered in the syllabus avoided forming watered-down replacements of secondary school science. They were seen as providing a sound basis for secondary school science, geography and agriculture. A pupil entering secondary school with a good idea of the concept of a particle is surely well equipped to embrace notions of atoms and molecules.

Similarly, a foundation is laid for understanding filtration, solution and cycle. Pupils actually filter dirty water to make it clean using a sand filter. They dissolve fertilizer granules in water and taste the slightly salty liquid produced. They make diagrams to show how fertilizer solution passes into plant roots and up into the plant. They see how fertilizer particles are used in plant growth but are released from plants (and animals) during decay.

Figure 4 shows the fertilizer cycle which is part of the syllabus.

The Fertilizer Cycle

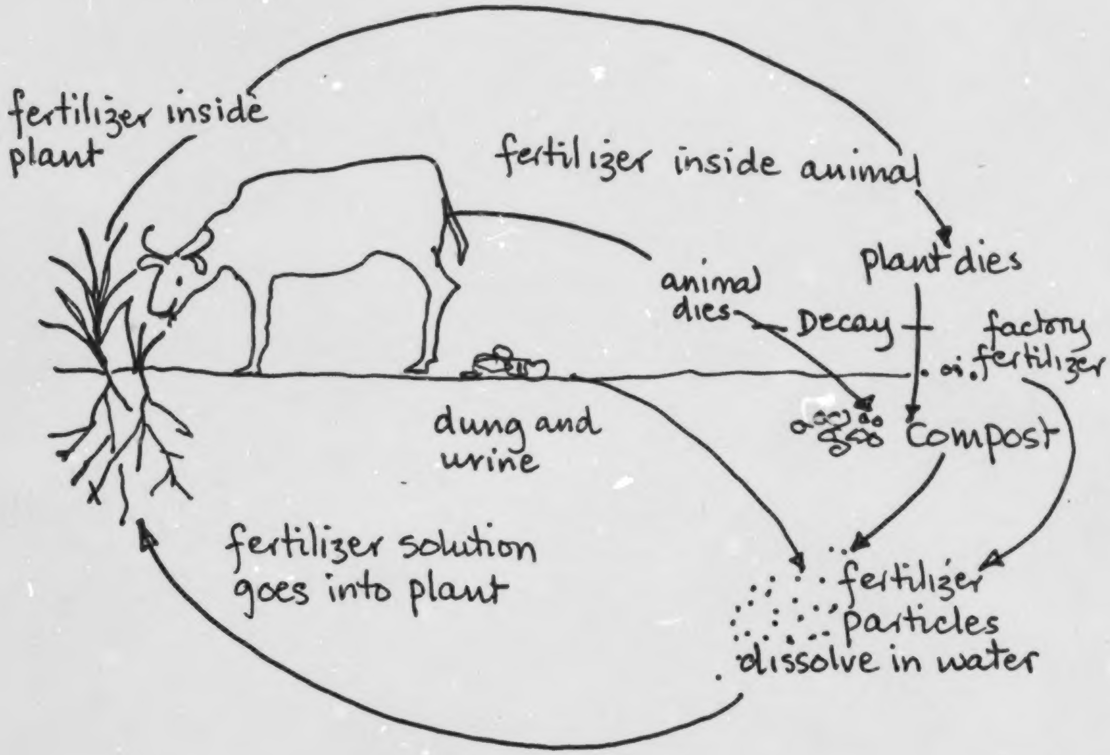


Figure 4

The syllabus document carefully details and explains the numerous main ideas or concepts encountered in each topic for each grade. Alongside are listed suggested experiences or activities whereby the ideas may be reinforced. Teachers are encouraged to use models. 'Rain' falling from a tin with holes onto an earth hill provides tangible evidence of soil erosion. After this pupils are asked to do things to their model so as to allow water to run off without washing soil away. Which group invests the best solution?

Materials Production

Although the syllabus document provides comprehensive guidelines to teachers, books for both teachers and pupils greatly aid successful implementation. In reality most teachers follow and entirely rely on 'the book ' In order to minimize costs, group activity books rather than textbooks for individuals were produced for pupils. These are shared by up to four pupils. However, without the Teachers' Resource Book they make little sense.

Materials for Grades 6 and 7 were developed by the working party and handed over in manuscript form to the publishers. These provided guidelines for future writers. Publishers have so far produced attractively illustrated books from the original manuscript for Grade 6. An extract from the Teachers' Resource Book is provided in Figure 5. An extract from the Group Activity Book is shown in Figure 6.

Research and Evaluation

From the start of the project a variety of government and nongovernment agencies were consulted in the process of developing the syllabus. These ranged from Boy Scouts to the Forestry Commission. National needs were identified. Surveys were conducted among teachers. What did they see as priorities? Observations were made of teachers and pupils in classrooms. The working party produced trial materials, taught these themselves and watched others teaching them. Materials for topics were sent to teachers in different parts of Zimbabwe to try out. Their views were sought. Important feedback came from meetings with groups of teachers who had been involved in teaching the same trial materials.

During the early stages teachers were invited to participate in planning the development of the syllabus topics which they themselves had largely suggested. This proved unsuccessful. The teachers had their full-time teaching to do so the time they could devote to writing materials was limited. They also found it difficult to identify and state clearly what were the concepts or 'main ideas' of a particular topic. Indeed, the working party itself, with experience in the curriculum development field, with a science background and with substantial teaching experience also found difficulty here. To date no evaluation of the programme has taken place other than that undertaken during the trial period. It is felt that full-scale evaluation is only possible when a complete set of materials (Grades 1-7) is in the schools and when the teachers have become familiar with them.

Extract From the Teachers Resource Book

AGRICULTURE

cash crops: cotton and tobacco.
monocultivation. pests. protein, oil and cereal crops.
storage of raw food. cattle management.

world food crops. food crops in zimbabwe.
citrus. small scale mixed farming.
land preparation. fertility trench. mulching.

food plants in the garden.
livestock. poultry.

fresh water fish.

animal products.
useful insects.

plants use up water.
soil soaks up water.

earth. seeds. food.

UNIT 26

Main food crops of the world

Skills
Interpretation of graphs and maps, investigating foods.

Science vocabulary
Annual, yield, staple, estimate, population, husk, scar. Names of various crops and places in the world.

Main ideas
1. Certain food crops are produced in greater amounts than others.
2. Different staple food crops are grown in different parts of the world.
3. There is a widening gap in many countries between the amount of food grown and the amount of food needed.

What pupils will be able to do by the end of Unit 26
1. Name the four main staple food crops grown in the world.
2. Write five statements of fact about rice and five about potatoes.
3. Identify parts of the potato and rice plant that are used by man for food and demonstrate that these contain food.
4. Interpret maps showing where crops are grown by answering questions. (pages 128-131 Group Activity Book)
5. Explain what the graphs on page 132 of the Group Activity Book show.

Introductory Activity

We need a great deal of food

Ask pupils which is their *main* food, i.e. do they eat more bread than maize meal or vice versa. Bread comes from wheat, maize meal from maize. These are important crops for feeding millions of people. These basic foods are known as *staple foods* and they form the main part of our diet. Rice and potatoes are staple foods in other parts of the world.

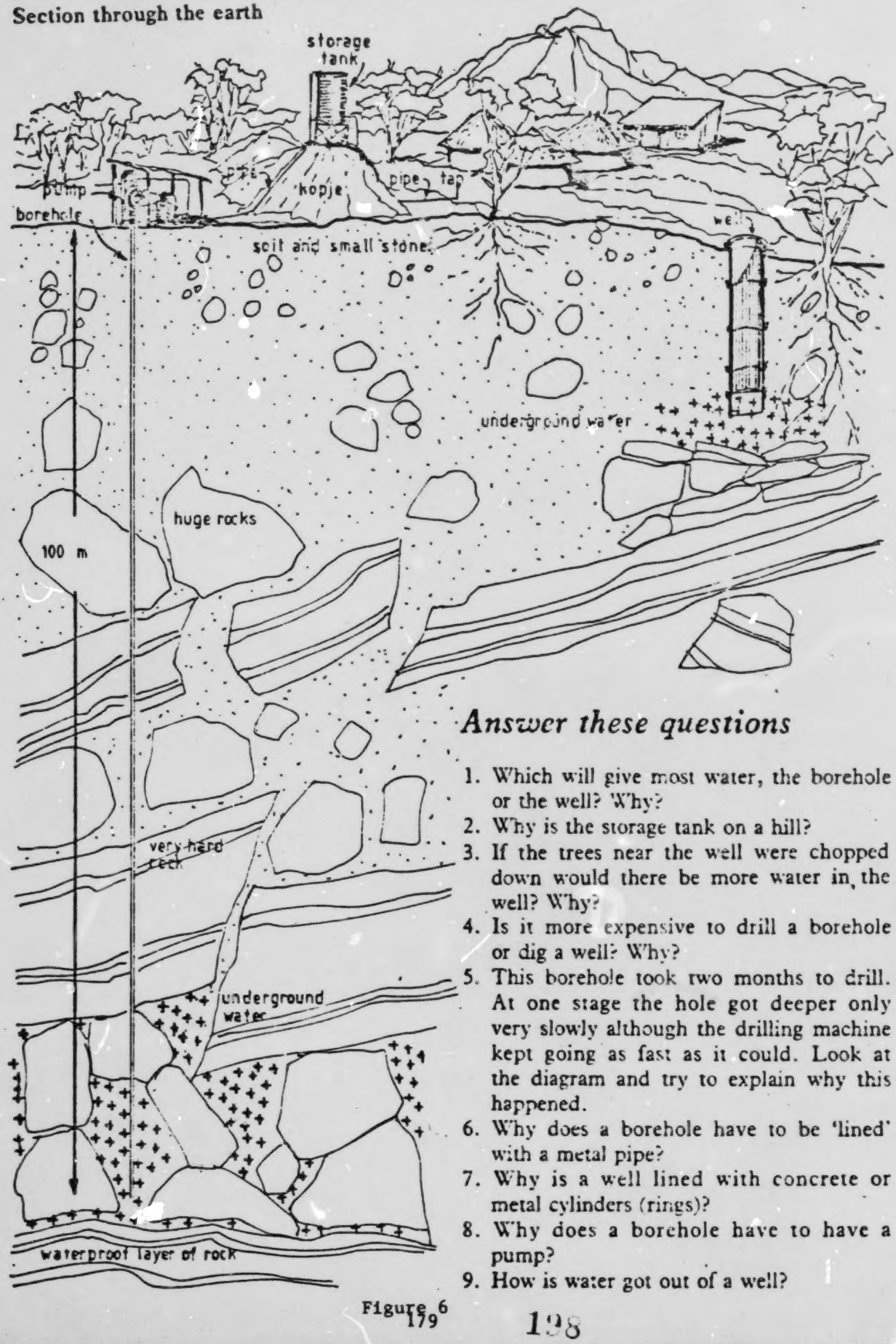
Try to get across an idea of the enormous amount of food each person needs, a country needs and the world needs. Bring a 5 kg bag of mealie meal into the classroom. Ask how long this will last one full grown hard working man. (Perhaps one to two weeks.) How many will he need in a year? (Work it out). Perhaps a family of 6-8 people would need 1 000 kg of mealie meal in one year, i.e. 1 tonne.

Do some calculations:
Say there were 700 000 families living in Zimbabwe : how much maize meal would the country need in one year? (700 000 tonnes)

Figure 2

Extract From the Group Activity Book

Section through the earth



Answer these questions

1. Which will give most water, the borehole or the well? Why?
2. Why is the storage tank on a hill?
3. If the trees near the well were chopped down would there be more water in the well? Why?
4. Is it more expensive to drill a borehole or dig a well? Why?
5. This borehole took two months to drill. At one stage the hole got deeper only very slowly although the drilling machine kept going as fast as it could. Look at the diagram and try to explain why this happened.
6. Why does a borehole have to be 'lined' with a metal pipe?
7. Why is a well lined with concrete or metal cylinders (rings)?
8. Why does a borehole have to have a pump?
9. How is water got out of a well?

Figure 6

Implementation of the Syllabus

As has been stated, the working party developed and tested materials for Grades 6 and 7. It is important to state the reasons for this. Most important was the need to see 'environmental awareness' in its fullest sense operating on as large a scale and as soon as possible. Since the majority of school children left school at the end of primary school, Grades 6 and 7 were important 'preparation for life' years. Another reason was to avoid overloading teachers with too many new ideas and materials. The social studies materials were being introduced at Grades 1 and 2.

Changes to the Environmental Science Syllabus Since 1980

Inevitably, and desirably, with independence in 1980 came the need to re-examine the entire school curriculum and to replace, readjust and accept elements of it that promoted the development of the new nation. Also inevitably, there was pressure to see change taking place for its own sake. This is common to all changes of administration and certainly not least to the radical political changes that Zimbabwe experienced.

The Environmental Science syllabus was changed in a number of ways. The focus upon agriculture was made more explicit. The title was changed to Environmental and Agricultural Science. More practical agriculture was included to back up the many demands being made for 'Education with Production.' Presumably because of the vastly increased secondary school system several items of 'simplified' secondary school pure science were introduced. A 'system for passing life on' section within the Body Systems topic was excluded and the topic itself was renamed. Apart from this section there are no significant exclusions and the size of the syllabus has therefore increased considerably.

The increased content of the new syllabus led to the most dramatic changes of all--the rearrangement in terms of order and grade of various sections of the Environmental Science syllabus.

Pertinent to these changes was the fact that the working party had dissolved at the end of April 1980. The work of change had to be undertaken by just two and then only one ministry official in a very limited time. And this, after the in-service orientation of teachers for the Environmental Science Grade 7 programme was already under way. Some of the changes made can be seen by comparing the summary of the Environmental and Agricultural Science syllabus (Figure 7) with the summary of the Environmental Science syllabus (Figure 1).

The Revised Syllabus Summary

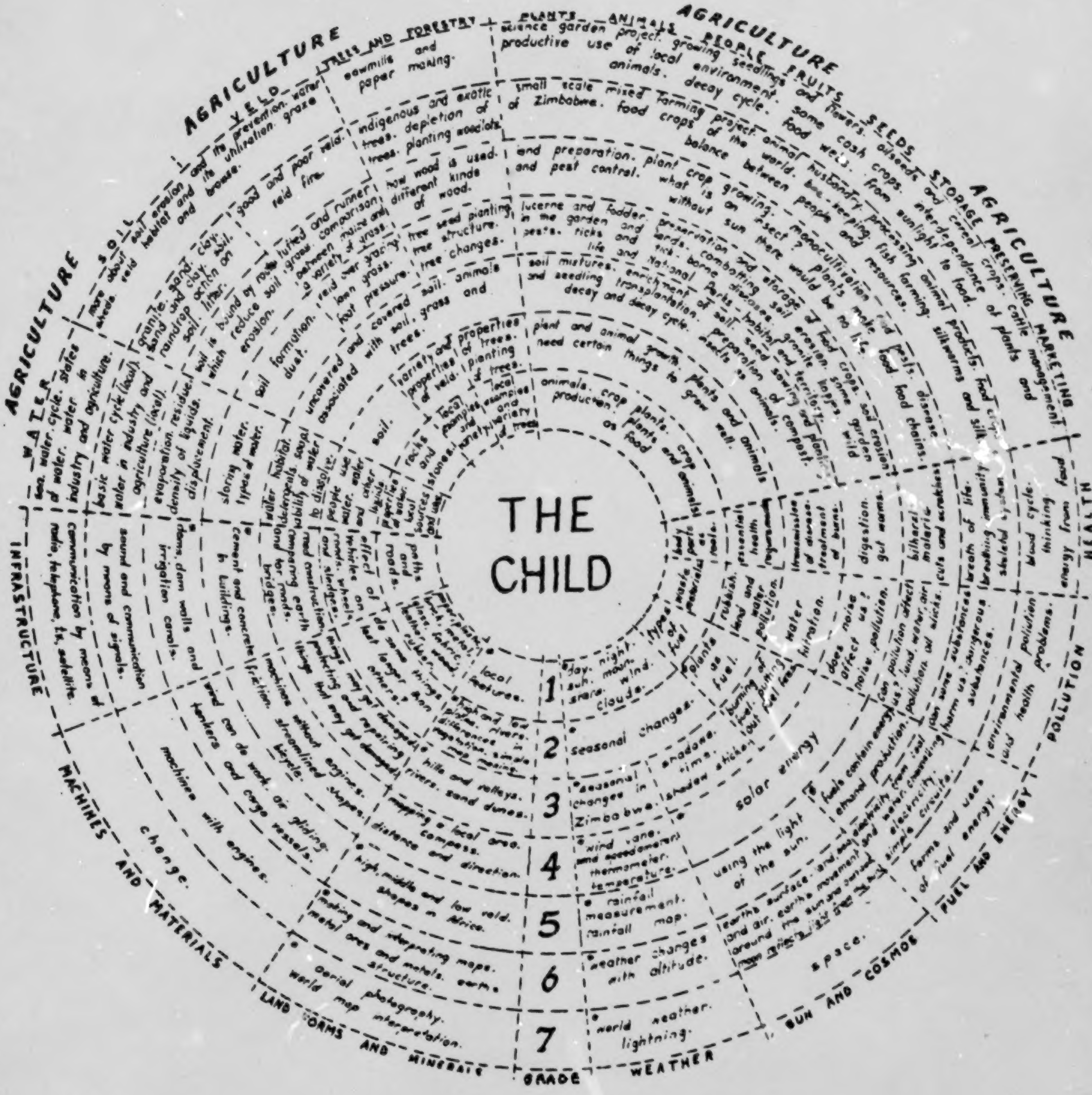

THE CHILD
GRADE
1
2
3
4
5
6
7
AGRICULTURE
WATER
SOIL
VELD
TREES AND FORESTRY
PLANTS
ANIMALS
PEOPLE
FRUITS
SEEDS
STORAGE
PRESERVING
MARKETING
HEALTH
POLLUTION
FUEL AND ENERGY
SUN AND COSMOS
WEATHER
LAND FORMS AND MINERALS
MACHINES AND MATERIALS
INFRASTRUCTURE
sea. water cycle. states of water. water in industry and agriculture.
basic water cycle (local). water in industry and agriculture (local).
evaporation. residue. density of liquids. displacement.
storing water. types of water.
water habitat. detergents. solubility of water. to dissolve.
people use water. water and other liquids. properties of water. local sources and uses.
more about soil. erosion and its prevention. water habitat and utilization. graze and browse.
granite. sand. clay. sand and clay. raindrop action on soil. litter.
soil is bound by roots which reduce soil erosion.
soil formation. dust.
uncovered and covered soil. animals associated with soil, grass and trees.
soil.
rocks and stones.
good and poor veld. veld fire.
tufted and runner grass. comparison between maize and a variety of grass. veld over grazing. lawn grass. foot pressure.
variety and properties of veld.
local examples and variety.
sawmills and paper making.
indigenous and exotic trees. depletion of trees. planting woodlots.
how wood is used. different kinds of wood.
tree seed planting. tree structure. tree changes.
variety and properties of trees. planting of trees.
local examples and variety of trees.
science garden project. growing seedlings and flowers. oilseeds and cereal crops. cattle management of plants and productive use of local environment. some cash crops. interdependence animals. decay cycle. food webs. from sunlight to food.
small scale mixed farming project. animal husbandry. processing animal products. food crops of Zimbabwe. food crops of the world. bee-keeping. fish farming. silkworms and silk. balance between people and resources.
and preparation. plant crop growing. monocultivation and pest control. what is an insect? plants make food. food chains. without sun there would be no life.
lucerne and fodder. preservation and storage. pests. disease in the garden and lands. combatting soil erosion. pests. ticks and tick-borne diseases. life and National Parks. habitat and territory. granite kopjes. garden wild
soil mixtures. enrichment of soil. seed sowing and planting. and seedling transplantation. preparation of compost. decay and decay cycle. insects as animals.
plant and animal growth. plants and animals need certain things to grow well.
animals. crop plants. crop production. plants and animals as food
body parts and roles.
waste materials.
personal health. rubbish. land and water pollution.
transmission of disease. treatment of burns. water filtration.
digestion. gut worms. does noise affect us? noise pollution.
bilharzia. malaria. cuts and scratches. can pollution affect us? land, water, air pollution. oil slicks.
breath of life. breathing immunity. skeletal system. can some substances harm us? dangerous substances.
blood cycle. thinking. environmental pollution and health problems.
energy from food
day. night. sun. moon. stars. wind. clouds.
types of fuel.
plants as fuel.
burning of fuel. putting out fuel fires.
seasonal changes.
shadows. time. shadow sticks.
seasonal changes in Zimbabwe.
solar energy
fuels contain energy. ethanol production.
electricity from coal and water. generating electricity. simple circuits.
wind vane. and speedometers. thermometer. temperature.
using the light of the sun.
forms and uses of fuel energy.
rainfall measurement. rainfall map.
earths surface and air. earths movement around the sun.
weather changes with altitude.
space.
world weather. lightning.
local features.
high and low places. rivers. differences in vegetation. simple map making.
hills and valleys. rivers. sand dunes.
mapping a local area. compass.
distance and direction.
high, middle and low veld. shapes in Africa.
making and interpreting maps.
metal ores and metals. earth structure.
aerial photography. world map interpretation.
paper, plastic, brick, metal, glass, fabric, leather, wood, rubber.
do some things last longer than others?
things may get damaged. protecting things that may get damaged and repairing.
machines without engines. streamlined shapes.
bicycle.
friction.
wind can do work. air gliding.
tankers and cargo vessels.
machines with engines.
change.
paths and roads.
effect of vehicles on roads. wheels and sledges.
road construction. comparing earth and tar roads. bridges.
cement and concrete in buildings.
dams, dam walls and irrigation canals.
sound and communication by means of signals.
communication by means of radio, telephone, t.v., satellite.

Figure 7

Summary

It is clearly premature and not the purpose of this case study to judge either the Environmental Science syllabus or its modification, the Environmental and Agricultural Science syllabus. Throughout the period from 1978 to the present there have been delays, disruptions, changes of course and consequent frustrations for both teachers and curriculum workers. There have also been periods of great joy and success.

What can be positively said of this project in Zimbabwe is that, through it, all children in Zimbabwe are encountering some form of innovative environmental education. Further, through the interest created by it there has been considerable media support for public environmental awareness and environmentally based studies.

INTERDISCIPLINARY ENVIRONMENTAL EDUCATION IN THE SECONDARY SCHOOL OF THE FEDERAL REPUBLIC OF GERMANY

by Dr. Günter Eulefeld*

The primary school in the Federal Republic of Germany comprises four school years (6 to 10-year-old pupils). Secondary school consists of two parts. The first part comprises six years (10 to 16-year-olds) and the second comprises two to three years (16 to 19-year-olds) during which time an academic or vocational course is pursued.

Instruction in the secondary school is broken down according to subjects. Each "Bundesland" (state) has a syllabus for each particular subject and grade. These syllabuses usually contain general topics and objectives but no detailed plans with regard to method. The graduation of a pupil to the next grade depends on whether or not the student has, on the average, succeeded in maintaining an adequate performance level in all subjects.

Each "Bundesland" has cultural sovereignty and organizes its school system by itself. The basic uniformity, however, is ensured as a result of the agreements of the "Staendige Konferenz der Kultusminister (KMK)" (Standing Conference of State Ministers of Culture) of the ten "Bundeslaender" and Berlin. Within each particular state the schools are centrally organized. That is why the syllabuses for all schools in one particular "Bundesland" are binding.

Introduction of Environmental Education to the Federal Republic of Germany

Questions concerning nature conservation and landscape preservation have always been dealt with in biology and geography instruction. They did, however, have only slight significance within the overall framework of instruction. The adoption of the environmental program by the federal government in 1971 entrusted the educational system with an important task, "to transmit the knowledge necessary to avoid endangering the environment" and "to educate with a view to generating environment-conscious behavior." The following years were spent incorporating environmental topics into the different subjects' syllabuses. The example below should show what topics are to be dealt with in secondary school (Table 1).

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Objectives and Teaching Methods

The objectives developed in the course of the discussion about environmental education (IUCN, 1970, UNESCO/UNEP, 1977) were adapted in the Federal Republic of Germany and manifested themselves in a resolution of the KMK (1980). The central message in it reads: "Relations with the environment have become a matter of life and death for the individual and for humanity as a whole. It is therefore the task of the school to generate in young people an awareness of environmental issues, to promote a willingness to deal responsibly with the environment and to transmit environment-conscious behavior which continues beyond the school years."

Since the beginning of the seventies work has been done in the fields of teacher training, in-service training and educational research towards possible ways of reaching these objectives in the course of instruction. From the standpoint of environmental science, the current situation is described as follows:

--topics concerning the environment have been included in the syllabuses of all subjects concerned

--pupils of all levels are informed about environmental problems

--the topics concerning the environment are taught independently in the different subjects

--as a result of this distribution usually no interdisciplinary projects are conducted

--for the same reason there is too little time to examine environmental problems in depth

--environmental education cannot attain the envisaged objectives as long as the problems of environmental pollution are only taught in the usual manner as new learning matter

--what is necessary is the assumption of interdisciplinary problems into instruction, their investigation by students outside of the school, and the inclusion of persons and institutions as parties in the teaching process

--when dealing with supraregional problems which cannot be studied in the problem situation itself, case studies, simulation and role games should be considered in which information from different fields and from controversial opinion areas is processed.

Suggestions for the Improvement of Environmental Education in the Federal Republic of Germany

In the last ten years activities concerning environmental education have greatly increased in the Federal Republic of Germany, as in most other countries. An annotated documentation of the time from 1974 to 1979 lists approximately 400 titles in journals and books (Eulefeld, et al., 1979).

State and private groups developed recommendations, concepts and materials on environmental education and have taken public action through conferences, lectures and excursions.

Improvement of the Syllabuses

It was met with general approval in the Federal Republic of Germany that instruction about environmental problems was foreseen in all syllabuses. There is criticism, however, because this instruction in the different subjects is not coordinated. For this reason biology and geography teachers from all "Bundeslaender" of the Federal Republic have developed a suggestion for grade levels 5 to 10 in which subject-specific and interdisciplinary topics for environmental education are identified. The topics in the overlapping area are particularly suited for cooperative projects with other disciplines. Such projects could be conducted during project weeks which are increasingly set aside at schools (Table 2).

Table 2: A suggestion for cooperation between Biology and Geography in the area of Ecology and Environmental Education at Secondary Level I (Eulefeld and Puls, 1978).

DISCIPLINE-ORIENTED ENVIRONMENTAL TOPICS BIOLOGY	ENVIRONMENTAL TOPICS IN THE OVERLAPPING AREA BIOLOGY – GEOGRAPHY	DISCIPLINE-ORIENTED ENVIRONMENTAL TOPICS GEOGRAPHY
grade level 5/6: *Ecological Equilibrium* (basic terms in ecology) – predator-prey-relation – food chain/food web	**Conservation and Restoration of Natural Space** protection of natural biotopes protection of species Recultivation-, Recreation area Agriculture	*grade level 5/6:* *Space-oriented environmental problems* (Interrelations and simple systems with basic terms in geography) *mining:* change of landscape *recreational areas:* landscaping *agricultural land use:* monocultures, fireclearing, overgrazing *town:* town climate, traffic *energy:* choice of location, pollution, types of energy *coast:* preservation of coast as natural space
grade level 7/8: *Analyses of ecosystems* – methods of investigation – ecological factors – systems of relations, regulation	**Human Interference to Natural Balance** *Man is changing environment* a concrete example from the own environment (forest or waters or agricultural used areas or wet areas) *Global problems of landscape destruction* prariefication, carstification, deforestation, soil erosion, salinization, sea: pollution, over-fishing	*grade level 7/8:* *Regional bound interaction-webs* (regional geo-ecology) natural disasters: produced by nature or by man industrialization and urbanization in special regions (global)
grade level 9/10: *Ecological processes in the biosphere* – steady state – energy flow – matter cycles – population dynamics	**Limits of Growth** population growth world nutrition recycling consuming resources pollution abatement **Environment-Planning** Points of view: collision of interests, planning processes, legal basis, pay-as-you-pollute-principle, public tasks, citizen's initiative Example from the own community or from the near (landscape preservation, protection of nature supply, pollution abatement) pollution and protection of waters **Environmental Problems in Overcrowed Areas** stress, drugs, occupation, leisure time effect of pollutants, noise, radiation on human beings pollution abatement problems, effect of pollutants, airpollution, menace from power industry, nuisance from traffic and noise	*grade level 9/10:* *Planning processes for environmental protection* space planning and environmental protection town planning, town situation, monument conservation results from space planning measures Environment in tourist- and recreational area revaluation of an area landscape as ecosystem: conservation, destruction, renovation of a landscape pollution of waters: the sea as living and economic space

A Paradigmatic Instruction Unit for Interdisciplinary Instruction at the Secondary Level

The preparation and execution of interdisciplinary instruction in such a way that the natural and the social environments together with their persons and institutions are included is still foreign to most teachers at the secondary level. In order to study these possibilities an instructional unit was developed for cooperation among the subjects biology, geography and social studies. In the course of approximately 14 double periods, the 15 and 16-year-old students conduct their own investigation in small groups.

The instructional unit, "Problems of Water Pollution," is the result of the cooperative efforts of natural science and social science educationists. Its trial run was meant to test cooperation of subject-specific content and everyday experience and the self-sufficient investigations conducted by the students within their own communities.

In actual practice, interdisciplinarity does not only mean that subject-specific content is conglomerated. The planning of interdisciplinary instruction must encompass the entire teaching process. That is why the following aspects were taken into consideration in the instruction unit:

--the prior knowledge of students about the foreseen content and methods for working in order to enable them to make a subject-matter-oriented choice of topics (films and written information)

--reflection of cooperation problems in teamwork (group experience with use of a game; students make up their own "rules" for their cooperation)

--identification of the most important topic areas, namely:

- Investigation and classification of the quality of running waters in one's own community by means of a biological (biological indicators) and a chemical (biochemical oxygen demand) instrument as well as the development of the ecological concepts needed for this.
- Preconditions for the conservation or restoration of only slightly polluted running waters through legislation, control measures of the administration and through technical installations (sewage disposal plant) and communal financial planning (construction of questionnaires, and surveys of the local administration).
- Knowledge and attitudes of the population concerning the water pollution problem and inquiry into some causes and effects of water pollution (construction of questionnaires and surveys of the population and in different companies).

- Four guiding programs with work steps, texts and control steps were developed in order for the teams of students to work on the four topic areas. The work steps promote self-sufficient investigation and processing; the texts contain the necessary contextual information and the control steps serve to encourage the students to think about their work, to keep records, prepare plenary phases and identify and explain the key concepts.

- Each group dealt with different aspects of the problem under investigation. This study concerning the water situation in one's own community is meant to guide the students to self-directed discovery and processing of environmental problems. It should also help them to glean the related information from different subject areas and conglomerate it.

A Didactic Conception for Ecology and Environmental Education

For a scientific discussion of a new subject area "Ecology and Environmental Education," it is necessary to develop a didactic conception for the continuous structuring of teaching and learning situations. A suggestion for this was published in 1981 (Eulefeld, *et al.*)

The didactic conception "Ecology and Environmental Education" consists of three parts: the first part offers justification from the standpoint of school theory as well as three reference sciences--biology, sociology and economics; the second part contains three components for the planning of teaching and learning situations and a discussion of appropriate teaching methods; the third part gives an example for the planning of an instruction unit called "Protecting the Forest" using the three components out of the second part: "real subsystems," "statement systems," and "ecological thematization viewpoints."

--"Real subsystems" are parts of the biosphere, which, however, are not identical with ecosystems as identified in the biological sciences. Instead, they are characterized by the particular influence man has on them. Man interferes with life in the biosphere and alters the system of abiotic and biotic factors because he uses the environment for his own purposes and, thus disturbs it. This occurs as a result of the decisions and actions of individuals and groups using technical aids.

--"The Forest" would not be a "real subsystem" in the present sense if only one study of one specific forest with respect to its association of species and the quality of its soil were to be conducted. It could, however, be selected if, in addition, it were asked what its history is, whether it is a naturally growing forest there or whether it is foreign to its location, who cares for it, for what purpose, with what methods and what measure of success, what economical gain and what difficulties go hand in hand with ownership of the forest. what forest protection laws are in effect how they are enforced, what significance the forest has for the native population and for people in developing countries, what role forests play for climate and soil, how they react to air pollution, etc.

--"Statement systems" are of a symbolic nature. They are areas of knowledge which are used to examine, understand and explain real subsystems. Such subject areas stem, in part, from individual disciplines such as botany, psychology, physics or economics. Sometimes interdisciplines are involved such as systems theory or planning theory; and finally there are essential extra-scientific statements such as the everyday knowledge of the inhabitants of the area, experience from the spheres of work and recreation, historical traditions. Only the simultaneous use of different statement systems with explaining value makes possible the analysis of complex "real subsystems." An important principle for the selection of statement systems is the guarantee of possible action for the students.

--"Ecological thematization viewpoints" make it possible to select and structure the subject matter. They limit the number of ways of looking at subsystems and emphasize lasting fundamental viewpoints as well as social problems and man's involvement. Such thematization viewpoints can be assigned to four characteristics of ecological systems: (1) intermeshing, (2) problematicism, (3) historicism and (4) process-like nature of systems. Some examples are (1) cycles; multiple effect network; variableness and uniformity in civilizational systems; (2) destruction or preservation of the biosphere; general welfare and the quality of life of those concerned; (3) evolution process in natural and in technical/civilizational systems; (4) behavior in effect networks; dialectics of man and nature.

At different points of this didactic conception it is said that environmental education is not oriented to disciplines but to situations, problems in the environment, the interests and actions of different interest groups. This kind of environmental education must be realized through action-related methods of instruction. Examples are provided in a special chapter "teaching methods," as well as in the third chapter of the book about the construction of an instruction unit.

Summary

--In the Federal Republic of Germany environmental topics are treated in different subjects at the secondary level.

--Environmental education is seldom coordinated between the different subjects at the secondary level.

--The research work focuses on (1) the development of action-oriented instruction materials, (2) the study of possibilities for realizing problem-oriented, interdisciplinary instruction in the given school system, and (3) the scientific systematization of the field of ecology and environmental education.

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A PROJECT OF ENVIRONMENTAL EDUCATION IN BRAZIL

by Dr. Myriam Krasilchik*

Brazil is a federalist republic occupying nearly half the Continent of South America. It is exceeded in size only by the Soviet Union, China, Canada and the United States. It has an area of 3,286,470 square miles (8,511,965 sq. km.) extending 2,684 miles (4,320 km.) from north to south and 2,689 miles (4,328 km.) from east to west. It has 23 states, 3 territories and a federal district, with a total population of nearly 120 million people.

It is a big nation with a wide range of economic, political and social problems and an enormous variety of biological problems. Situations like the improper use of natural resources, deficient basic sanitation, unbalance in energy production and utilization and chronic malnutrition afflicting most of the population defy the whole community in search of solutions that have received some answers represented by environmental education programs.

Those programs were developed not only by the several institutions that belong to the Brazilian Educational System, including the Ministry of Education (federal level), and the Offices of Education (state and country levels), but also by other agencies such as the environmental offices and other entities dedicated to nature preservation and environmental defense.

Actually, a coordinated policy for environmental education programs is nonexistent in the country. In 1977, a work group organized by the Office of Environmental Protection (SEMA) produced a document in which the chief problems and priorities of that activity are defined in relation to Brazil. Among the mentioned recommendations, the following stand out: "The necessity to achieve the maximum benefit from the educational effort, making the best out of the relationships existing between the federal and state systems of education among the several components of each one of them and between those and other separate agencies that, in spite of not being linked to the educational structure play an outstanding role in the formation and diffusion of culture and technology in the country."

A significant portion of the efforts for environmental education is concentrated in programs of formal education developed by educational institutions in the primary, secondary and university levels.

We have as an example in the university level the introduction in 1976, in the engineering curricula, of a compulsory discipline called Environment Science "that should especially aim at the relationships between the elements that have a social and economic nature and the process of creative elaboration proper to the engineer, having in mind to create attitudes and develop values about the environmental problematic, arising in the future professional the consciousness of natural resources preservation." Unfortunately, this initiative was not imitated by the curriculum makers in other university-level courses.

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If experiences in tertiary level are seldom present, efforts in the elaboration and implementation of environmental education programs for the primary and secondary schools by various types of institutions have been more numerous. We can mention some examples such as the Nature Project, developed by the Office of Education in the Rio Grande de Sol State that has as its aim to guide schools in making the best out of the available areas, making the school environment more agreeable through the growing of vegetable and flower gardens. The activities include classroom and laboratory activities and actual tending of the land in the school yard.

The Office of Education in Brasilia, Federal District, developed an Environmental Education Project in the Ceilandia district, in the outskirts of Brasilia, a region with a poor population. The whole community participated in the curriculum making and that curriculum is now being developed in schools under the careful guidance of a multidisciplinary technical team.

In 1980, another working meeting was held to analyze the situation of environmental education in Brazil. Some of the recommendations in relation to the subject made during the meeting are the following:

1) The mobilization and organization of the communities are the fundamental element for the success of environmental education. However, there should be a national mechanism of coordination of all efforts in order to rationalize them.

2) There must be research stimulation for the production of materials and methods to be used in environmental education. The preparation of those materials must be preceded by research about the necessities which they must fulfill and followed by evaluation of impacts resulting from their application.

3) Efforts must be made to promote the development of the teaching of environmental education with an interdisciplinary character in the primary and secondary schools.

Within that context we wish, for several reasons, to describe in detail the project developed by the Science Teachers Training Center from Sao Paulo (CECISP) supported by the Science Teaching National Project. First, it presents a wide range of aims and is meant to be spread and used throughout the country; second, it has been applied in an experimental situation for formative evaluation and from that experience there resulted interesting data that can be extrapolated to other equivalent experiences.

The project, designed for the first eight years of schooling, is made up of teachers guide for the first two years in elementary or primary school, books for the student and teacher in the two following years, and a set of 18 modules and corresponding teachers' guides to be used in the four last years in elementary school, besides other didactic material as games, audio visuals and laboratory equipment.

In the modules, important themes that treat the most common problems related to environmental preservation are discussed. The themes of the modules are: (1) Water and soil; (2) Time; (3) Living things relationships; (4) Waste; (5) Man and the environment; (6) Man and plants; (7) Air; (8) Parasitism; (9) Living things and environment; (10) Instruments; (11) Populations; (12) Natural resources; (13) Food; (14) Cities; (15) Biosphere; (16) The evolution of Man; (17) Energy; (18) Pollution. Besides, those themes can function as suggestions to the teacher, who may use as examples cases related to the community where the school is located. An observation that must be made is that due to the authors' backgrounds that the project, like many others, basically treated urban problems, ignoring some important problems from rural areas.

During material development, the following principle was obeyed: the curriculum elements are not prerequisites among themselves and except for the first four years, there is not any planned sequence to the modules; they can be used wholly or partially in any order. It was also admitted that, although the project had been conceived by science teachers, the modules could be used in other disciplines that belong to the curriculum in the first eight years of schooling, like social sciences, languages, and art.

The methodology proposed in the project is also innovative in the Brazilian context permitting active student participation in laboratory activity, structured discussions, games and simulations, and research projects. The basis for this proposal is that those didactic modalities develop the students' ability to think logically and critically, to make decisions, and to act.

The material was elaborated from 1977 to 1979; then, during the 1979 school year, an evaluation was made in order to verify the following:

a) adequacy of the materials for the students' level of schooling.

b) the accuracy of the language used in the students' texts.

c) the interest aroused by the subject matters treated.

d) the knowledge and attitudes that result from the project's application.

e) the necessity of the teacher's special training for the project's proper use.

f) if the school must offer special conditions for the material's application.

Although the program had been planned for schools throughout the country, it was evaluated only in the State of Sao Paulo, because in previous evaluation projects it was verified that the differences among the results obtained in several states were so little that they did not justify the expenses and the difficulties in the experimental application on a national scale.

Thus, each module or manual was applied in a sample consisting of 6,301 students from public schools in the State of Sao Paulo.

The collected data belonged basically to three types: analysis of notes collected from students' and teachers' guides; reports from classroom visits; and comments collected during meetings attended by the project authors and the teachers that applied it. It is interesting to mention that it was decided not to use the results from traditional tests because it was considered that type of instrument would not contribute to project revision, since the students had not worked with the complete set of materials and it would be very difficult to isolate the project effect from other factors acting upon the learning process.

In order to prepare themselves to apply each one of the modules, the teachers attended a 20-hour course. Afterwards they used the material for about two months. After the experiment, the teachers participated in meetings where the problems found in project development were discussed.

Each teacher wrote down in a teacher's guide the observations that he/she deemed to be of interest to the project revision; in addition, he/she sent CECISP five copies of students' books chosen at random. Some 626 direct observation classroom visits were also made which corresponded to an average of two to each classroom. During the visit, the observers attended the classes, analyzed the school conditions and interviewed teachers, administrators and students.

The sum total of the results thus obtained was then analyzed by the evaluators, always having in mind their potential contribution to the project revision. A survey from data usage for revision has shown that 44 percent came from teachers' meetings, 30 percent came from an analysis of book copies, 14 percent came from training courses and 12 percent from visitors.

Even if we consider that the visits did not represent the largest part of the revision elements, they furnished important information about school conditions and students', teachers' and administrators' attitudes in relation to environmental education.

After data compilation and analysis, and based on them, the project was revised and then it was addressed to a federal agency for publication and copious distribution, which did not happen till the present date. This situation exemplifies a dilemma difficult to be resolved by project makers in underdeveloped countries, where the greatest part of the school population is needy. The project distribution through commercial channels increases the project costs. The distribution through official mechanisms cheapens the books but it is inefficient.

Although several significant aspects such as students' difficulties in dealing with charts and scales and their resistance in working for a long time with the same topic have been identified, in this report we shall consider one aspect that we deem crucial and of the greatest interest.

The Environmental Education Project basically proposed that the students, based on the knowledge acquired in the classroom, analyze the problematic situations in order to make decisions and to make options according to their own values. That aim demanded an intense teacher-student and student-teacher interaction during the analysis of divergent ideas to discuss the problems focused. Teacher's guide suggestions and the teachers' training courses taken by the teachers that were going to participate in the project evaluation had been oriented in this direction. However, in spite of all guidance, the teachers used the modules in an authoritarian way without fostering discussions and emphasizing the informative aspects, that is to say, giving a traditional treatment to the new topics that made up the curriculum.

The teachers' attitude leads us to a certain type of reasoning: Will it be possible to carry out a kind of nondirective teaching really discussing value problems and using preplanned and highly structured materials?

What should be done to help the teachers to teach according to the demands of environmental education without using classic procedures and materials that have been used in curricular projects?

It seems to us that the most urgent necessity is to prevent environmental education programs from being reduced only to the introduction of topics in the schools' curricula that would continue to be taught in a bookish and memorizing way.

Fundamentally, in all school projects we should aim at changing the teachers' attitudes; they should "stop being the ones who make the explanation" and start being "the ones who guide and help the students" to develop and verbalize their own ideas. The institutions that are responsible for environmental education should play an important role in that effort.

COMMUNITY PROGRAMS

The case studies in this section are community level programs. Ranging from school science projects to changing the fishing practices in villages, each incorporates involvement with the local environment as one of its elements. Many community programs have an action component; three in this volume are directly concerned with positive actions on the part of school children and community members.

Cherry Mares portrays a program which uses litter as a basis of science study. The themes of this action-oriented program are personal responsibility, social awareness and improving the environment. Based on their belief that litter, grafitti and vandalism cannot be isolated from overall social and environmental problems, they use them as a starting point for the study of environmental issues. The program uses the local environment as a resource for learning and often involves the children in practical work.

The School Site Development Project described by John Earnshaw and Peter Skillbeck in Australia provides another example of an interface between community and school for mutual benefit. The barren ground surrounding a new school was transformed into a beautiful, usable and educational surrounding. The students were involved in the planning process and thus afforded an opportunity to make real decisions about the environment. The work was accomplished in working bees, using student and parent volunteer labor and donated machinery.

The community provides a learning resource for education as well as the work force for project implementation. In the community-based science program for Australian Aboriginal schools described by Steven Davis, John Harris and Stuart Traynor, the local environment provides the setting for study and contact with the natural world. Science is made meaningful to the students by reference to the familiar world of the students and linkage to Aboriginal knowledge. The case study provides examples of using the seasonal cycle as a framework for science curriculum and of a teacher's use of Aboriginal knowledge of a mangrove environment as the basis for a transect study. The article specifies guidelines to interacting with a community with sensitivity to local traditions. The cross-cultural guidelines to Aboriginal learning strategies put forward are based on a framework of skill development transferable to other cross-cultural learning situations.

The garden program described next also provides contact with the natural environment for new immigrant groups in Australia's urban settings. Sally Jeavons describes the Melbourne response to different ethnic populations' need to have traditional vegetables. The gardens which resulted furnish participants with more than food, giving urbanites contact with the natural environment, a recreation source for all ages and nationalities, constructive use of leisure, and an opportunity to work together and exchange ideas, and a valuable use for vacant or underutilized land.

The two university programs in this section are a recognition of the potential of the community as a learning resource and community-based education efforts themselves. In both teacher training programs there is a dual mission of curriculum preparation and development of personal attitudes toward the environment. Luis Capurro's description of the application of environmental education modules in Guatemala gives a detailed plan for a teacher training model. Lynn Hurry's case study on an African example also provides a step-by-step description. Hurry's program recognizes the integrative potential of history and geography, using the local environment as the teaching resource. The students' field investigation of one town provides maximum contact with reality and a microcosm from which to generalize relationships to the greater world.

Two other African studies were nonformal education attempts to change resource use patterns of villages in developing countries. Both programs illustrate the importance of sensitivity to the infrastructure of community influence and of acceptance and trust. In the Ghana program described by Hubert Dyasi, staff people lived in the village to establish a level of trust and mutual concern and involved key people such as fettish priests and local cultural leaders. The program goal was to educate residents against the use of insecticides in fishing because of the poisons' deleterious effects on human populations downstream and on those who ate the fish. The educational techniques included song, dance and drama in Ghana and also in the Kenya program where the primary medium of communication was radio.

In this final case study, Irma Allen describes a pilot case designed to reach nomadic pastoralists in Kenya who are largely illiterate and live in remote, generally inaccessible areas. The radio programs use the maximum possible participation by the nomads and cover topics of interest to these people. A before-and-after survey reported on in the case study offers insight into the effectiveness of the radio medium and also into environmental attitudes and perceptions of those interviewed.

People's immediate surroundings are the environment of most interest and significance in their day-to-day lives. As such, the community provides a meaningful resource for study and one suitable for action programs. The case studies in this section are examples of efforts of empowerment around environmental issues and projects, of scientific studies using the local natural world and local knowledge about it, and also of leisure and recreation based on the utility and aesthetics provided by local surroundings.

EDUCATION FOR ENVIRONMENTAL RESPONSIBILITY IN BRITAIN

by Cherry Mares*

THE DEVELOPMENT OF ENVIRONMENTAL AWARENESS IN SCHOOLS

The Keep Britain Tidy Group Schools Research Project started at Brighton Polytechnic in 1973 with the aim of increasing children's sense of responsibility for the environment in general and emphasizing the problem of litter. This aim is being achieved by giving children experiences through which they can be encouraged to understand and become aware of their environment, concerned about its improvement and, among other matters, concerned with preventing the littering and graffiti which are common in the United Kingdom. Litter, graffiti and vandalism may be relatively minor problems but they cannot be isolated from overall social and environmental problems. Consequently, they serve as a useful starting point for a study of wider environmental issues.

BASIC PRINCIPLES

The research started with a series of surveys to find out if and how environmental responsibility was being developed in schools.

200 local authorities, 200 schools and 65 of the 276 UK environmental organizations were asked to provide information relevant to environmental education. The responses showed that little organized and formal work was being undertaken, but that there were many examples of good practice. From these examples certain principles were established which became fundamental to the later work of the project.

The principles are that education for environmental responsibility should be long-term, curriculum-related, multidisciplinary, give practical experience, use the environment as a resource for learning and involve the family and the community. Based on these principles, and after lengthy pilot testing with 50 schools and over 2,000 children, learning kits for children of 4-7, 7-9, 10-11 and 12-14 have been produced and are regularly monitored in use. About 15,000 of these kits are now being used in the UK and various other countries including Ireland, Canada, Australia, Hong Kong and Singapore. In translation they are also used in France, Germany, Holland, Belgium and Wales.

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EVALUATION OF THE PROJECT

Both subjective and objective evaluation has been an important part of the research project. Tests of environmental awareness were given to 500 10- and 11-year-old children who had worked with the learning materials and to 500 who had not. The reactions of the two groups were significantly different, with the experimental group showing considerably more awareness than the control group of the environment and of environmental issues.

PRACTICAL WORK

Pupils using the materials carry out a great variety of practical work, some of which is directly connected with litter. One such exercise (for pupils of 7-9) involves going into the school playground with plastic bags and gloves to collect litter from the ground and from litter bins. The pupils then sort the litter into different sets of materials such as paper, plastics and metals. They use these sets as a basis for mathematics by exercises in weighing and measuring and by recording their findings with a variety of types of graphs. Younger children do similar sorting exercises, learning about the properties of different materials by handling them. For safety reasons the younger children do not work directly with litter but bring packaging from home.

Some of the basics of science--for instance, simple hypothesis testing--arise naturally from this work as children carry out various tests for biodegradability, burying different types of litter in earth and examining it every few days over several weeks. The emphasis is on learning by experience what happens to litter when it is left in the environment.

PERSONAL RESPONSIBILITY AND INFLUENCE

At a very early age children can be introduced to the idea of responsibility. One way of doing this is to encourage them to think about who looks after the school and in many cases the school caretaker is asked to talk about his work. This always interests the children who enjoy examining and using various machines. They discover some of the unpleasant aspects of the work of the caretaker and cleaners, and there is a natural progression from this to thinking about how they can make the caretaker's work easier.

Similar opportunities occur when the refuse collectors come to school and the children can meet them and learn about their work. They discover, among other things, that this work could be made more pleasant if the public were more considerate about rubbish and made more effort to wrap up dangerous or unpleasant refuse and to compost household waste instead of discarding it.

At one school 5-year-olds observed that their school dustbins were overflowing at the end of each week. They asked why no more bins were available and when they were told that the local authority would not provide more they wrote to the Chief Executive. Eventually the number of refuse bins was increased.

Another group of children wrote to their local authority pointing out that an area of waste ground near their school was piled with rubbish and looked very unsightly. The Environmental Health Officer wrote to thank the children for their interest and to say that the rubbish would be cleared. There are many similar examples which show how this work encourages children to find out for themselves that they can have a real influence on their environment.

SOCIAL AWARENESS

Most teachers using the learning materials take the children to visit their local shops, parks, streets and station, and encourage critical studies of the facilities provided, not only for litter control but for general public use. The children consider the siting of bus shelters, the provision of seats and telephone boxes, the layout of shopping precincts and all the different aspects of design which influence daily life. They talk to shopkeepers about public behaviour and to pedestrians about their views on such matters as one-way systems, pedestrian precincts and the supply of litter bins. They look at the design of street furniture, lamp standards, notices. litter bins and railings.

On one occasion, 6-year-olds taken for a walk on dustbin day were surprised to find that even large and expensive-looking shops had put out rusty lidless dustbins which attracted flies and were a source of offensive smells. In the same street the children saw a tramp rooting in the dustbins and taking out objects to put in his sack. These two experiences led to discussion about the responsibilities of local authorities, the collection and spending of rates and taxes, homelessness and poverty. Although only six years old, these children were extremely interested in finding out about community organization and administration.

A concern about litter naturally leads children to wonder what happens to all the rubbish after it has been collected. A municipal trip is not the most obvious place to take 5- and 6-year-olds on school outings. But some schools arrange such visits and reports show that they act as teaching opportunities for lively and interesting work which can involve investigating different methods of refuse disposal including landfill and incineration.

IMPROVING THE ENVIRONMENT

Children taking part in studies of this kind become very aware of environmental quality and often want to help in the improvement of their environment. They can help in many ways, from simple bulb planting in the gardens of a school or a local old people's home to major clearance and replanting projects. In several areas where the local authority has been discouraged by vandals breaking trees and uprooting flowers, children from local primary schools have helped to replace the damaged trees and plants. In some areas where this happened, vandalism has decreased. One reason for this could be the reluctance of elder brothers and sisters to destroy the younger children's efforts.

Children too young to be involved in more difficult practical work have nevertheless planted seeds in their classroom and carried out tests recording germination success under varying conditions, experimenting with soil, light and water. This is the basis for early science experiments. Later, when the plants are transferred to the garden, the foundations of environmental improvement are established.

RECENT WORK WITH SECONDARY PUPILS

The most recent work of the project has been concerned with the involvement of secondary schools. A series of five units for 12-14-year-old pupils is now being produced and further units will be added. The five units--on paper, glass, metal, plastic and waste materials--explain the manufacture of the different materials, explore the linkages with science, technology and industry, and examine the potential influence on the environment of the production and consumption of goods. At all times emphasis is laid on the importance of individual choice in environmental issues.

Work in secondary schools has been concerned not only with the production of learning materials but also with the pilot testing of a scheme linking multidisciplinary environmental education with language exchanges. This scheme involves 14-year-old pupils working in bilingual groups in both France and England comparing various aspects of man's influence on the environment. The initial results suggest that this new approach is more effective than the traditional language exchange in giving pupils both a greater incentive to use and learn the second language as well as a more meaningful contact with the other country.

The work of the project continues with the monitoring of the materials in use and the production of further materials for infant and secondary pupils.

The intention is to introduce education for environmental responsibility across the curriculum to pupils of all ages.

SCHOOL SITE DEVELOPMENT

by John Earnshaw* and Peter Skilbeck** (Australia)

A school which has had some outstanding successes with parent and general community involvement is Sebastopol Primary School on the outskirts of Ballarat, Victoria, Australia. A declared disadvantaged school, Sebastopol represents much that is innovative and forward looking in primary education in this state.

Since late 1978, the school community--consisting of teachers, pupils, parents, and other interested people--has operated from a new building which is both unusual and practical in its design. It incorporates open space learning areas, special purpose areas, staff stations, and a central atrium large enough for several classes to be involved in various activities at the same time.

The local community is very proud of this school building and grounds, which among other things, demonstrate the importance of architecture in planning for educational communities. The building is utilized widely by the community in a variety of ways--for after-school programs in pottery, leatherwork, drama, macrame and ballet, as well as local municipal council musical programs. However, being confronted with the reality of a new school site where a magnificent modern building was placed on five acres of nothingness posed a challenge for the Sebastopol Primary School. The grounds in a short three years have been transformed from barrenness to beauty, with trees, lawns, native plants, paths, adventure play area, fitness track, amphitheatre, oval, steps, netball courts, brick rebound wall, car park, individual class gardens, vegetable garden and hothouse for plant propagation. The remarkable story of how it all came together with its successes and frustrations follows.

The Sebastopol Primary School celebrated its centenary on March 10th, 1973. In the foreword of the Centenary Booklet 1873-1973 it is stated, "The old school building is now outmoded for modern primary education: we should like to see it remain as a piece of history, and serving an educational purpose other than that of a school. Our hope is that the move made last year for a new school building on the new site will soon be granted by the Education Department."

A committee of parents, teachers and interested community members was formed in September, 1975 to plan a new school on a site 400 metres north of the present school.

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One of the Educational Specifications for the new school was "Pupil Working Area (outdoors). The outdoor working area is considered to be a direct extension of the indoor pupil working area where certain activities involving noise, space or water may be carried out satisfactorily. Each area of about 400 square feet should provide for paving and planting, all-weather tables and seating, and pupil gardening. These areas might overlap with the whole outdoor working area and be integrated with the overall plan of the school's site development. Outdoor areas should be partially screened and partially roofed."

Detailed educational specifications were presented to the Education Department of Victoria. Public Works Department architects drew up plans for a very modern school.

The School Council organized a tree planting day at the new school site in September of 1976. The official ceremony to begin the planting of 1,000 trees was attended by a large gathering including all the children, teachers parents, friends past staff members, representatives from the Education Department and the Sebastopol Community and people who have had lifelong associations with the school. Every child at the Sebastopol Primary School planted a tree on the site for the new school.

Mr. Peter Skilbeck, who chose the trees--all native species grown at the Forest Commission Creswick Nursery--explained the layout of the grounds and the purpose of the trees. The paths would be lined with trees and shrubs which would flower at different times of the year and would provide habitat for birds and insects for the children to study.

The playing grounds would be protected by windbreaks and shelter trees. Although discussions took place with the builders and we were assured that entry of the heavy machinery would be from the opposite entrance, this did not occur. Out of the 1,000 trees planted only 17 were alive when we moved into the school two years later.

Early in 1978 a small grounds committee was formed to plan the development of the grounds and prepare a planting guide for the surrounding areas of the school. After a great deal of work and much 'red tape' from the Education Department, approval was given for this small committee to draw up plans and list the trees and shrubs planted. These then had to be forwarded to the Education Department for approval.

The last four weeks of 1978 were an exciting time settling into our new building of clean bright colours of yellow, blue and a rich green carpet and a huge light and airy covered central area, the atrium--planting and mulching trees and shrubs in the extensive garden beds around the immediate vicinity of the school and front area.

All children and staff planted a tree or shrub on the grounds. An open invitation was issued to all parents and friends to come along and plant a tree.

A roster of parents and teachers was organized to water the trees and lawns during the hot summer, six-week Christmas holidays.

The Education Department of Victoria provided the front gardens and lawns and the garden beds around the immediate proximity of the school were planted and grassed. The only hard playing surface was two basketball courts. All other areas of the gravelly grounds were leveled leaving them a dust bowl in the summer and a quagmire in the winter.

The School Council and Grounds Committee realized that prompt action was required to provide the 400 children with sufficient outdoor play equipment. A working bee was arranged to transfer all the play equipment from the old school to commence an Adventure Playground.

Following this most successful project a series of working bees was arranged. The Sebastopol Borough Council helped by providing heavy machinery and soil. The contribution of voluntary labour provided over 500 hours manual work and 80 hours use of machinery.

The pieces of equipment provided included a huge earth mound with a lookout post on top, a large concrete pipe tunnel, an organ pipe sand pit, horizontal ladders, climbing tire frame, wooden bridge, two swings, balance beams, totem pole, chain swing, jungle gym, a fort with a slide, fireman's pole, climbing frame, balance poles set on rocks, with steps up to them, a scramble net, and large pile of rocks. The pile of rocks is probably the most used piece of equipment in the grounds.

During the period of time of the construction of the adventure playground, the children were frequently asked to suggest and sketch the things they would like in a playground. Many of the plans were modified to include their suggestions.

"A Back to Committee" arranged a final gathering at the old school and from this group a donation of $400 was made for the purchase of indoor plants, pots and planters. The design of the school with its central atrium provides an ideal environment for plants.

After we had been in the building several months, we observed that the gardens and paths were not always in the best place for the children. There appeared several new pathways across designated garden beds and at several doorways the children were trampling down the plants in the nearby gardens.

It was decided that we would pave these areas and add some seats for the children and parents. We decided to conduct a "Brickathon." Children were encouraged to bring along old and new bricks from home and a competition was conducted to see which grade would bring along the greatest number of bricks. One boy in Grade 6 brought along 120 bricks himself. Overall, 1,400 bricks were collected. The next task was cleaning them and placing them in place. Red gum sleepers were used to make seats for these new paved areas.

Shelter fences were erected to give children privacy and protection. Trees and shrubs and creepers were planted to screen the treated pine fences and teatree fence. Black currant passion fruit vines were grown from seed and planted against the fence screening the rubbish disposal unit.

Despite many dire predictions about the futility of planning a vegetable garden, this project was commenced. Initially we encountered many problems--no water, clay soil, rocks and stones and drainage problems. We persevered and people responded magnificently--many loads of animal manure were carted and a three-foot fence was placed around the garden to stop dogs from scratching and digging in the beds.

Because of the high involvement and interest of the community and children in helping to plant and care for the environment in the school grounds, it was decided to erect a hothouse next to the vegetable garden so that horticulture could become a more integral part of the curriculum. The 20 x 8 foot hothouse had power and water connected so that the electric propagator and mist spray could become functional. Three brick compost bins form part of the fence around the vegetable garden as well as the hothouse.

A lovely circular herb garden was built near the vegetable garden. A tire was placed in the centre and then six tires were placed around it. Bricks were laid around the outer edge of the tires to form a path. Some of the herbs planted in this area include comfrey, rhubarb, onion, yarrow, celery, chives, tansey, salisfy, loveage, lavender, leek, rosemary, southern wood, and squill. Three varieties of mint--apple, eau-de-cologne and lemon-scented--were planted in a narrow area (2 x 15 feet) bordered by a wall and a concrete path. The wonderful resources of hothouse and propagator have enabled us to extend our planting. Many plants have been grown from seeds and cuttings, including cabbage, lettuce, tomato, correa, eucalypt, and geraniums.

During 1982 Grade 6 children have continued to be involved in a wild flower collection on a fortnightly basis.

The Grounds Committee is continually reviewing the changes occurring on the grounds.

A steep triangular area between access paths from Yarrowee Street was proving a slippery and dangerous waste area. Using old electricity poles as a boundary, a small rockery area was planted. Another rockery was built and planted near an entrance and seats were placed for the parents and children to use while waiting. Many attractive wooden framed rubbish bin stands were placed unobtrusively throughout the grounds so that the litter problem would be lessened. There were several ugly bare walls around the school. Climbing frames of treated pine posts and wire netting were erected in front of these and a selection of climbing vines was planted.

A large majority of the original plantings were native trees. We decided to plant a numer of deciduous trees so that there would be a magnificent splash of color in the autumn and so that the children would be aware of the change of seasons. Some of the trees chosen were claret ash, golden ash, prunus, weeping mulberry, weeping cherry and liquidamber.

The pottery teacher and children made a birdhouse and pottery birdbaths and food trays for various parts of the grounds.

During the last few months many nectar and insect-eating birds have appeared in the grounds and are feeding on the flowers. Some of these are red wattle bird, eastern spine bill, several other honeyeaters, pardalote and thornbills.

The trees have supplied us with some excellent nature study. The emperor gum moth larvae is a common sight and cocoons are found on the branches of the eucalypts. Possibly the most colorful visitor is the monarch butterfly which feeds on the swan plant or milkweed. We have planted many of these plants in various parts of the grounds so that children can observe the wonderful life cycle of the monarch.

There was a special invitation to all parents and children to attend a special second anniversary working bee to develop a fitness track on Sunday, November 23rd, 1980. A barbeque lunch was arranged at the completion of the work. A wonderful response to this invitation included over 80 parents and staff and 100 children raking, digging, weeding, sawing, concreting, bolting, and making tea. Although the working bee was timed to finish at 1:00 p.m., there were still 30 keen and interested workers completing pieces of equipment at 4:00 p.m.

Early in 1982 a grant was made available for the development of a grassed area. The soil in this area was very gravelly with a steep slope (badly eroded) on the eastern side near the school building. A concrete curbing channel was poured and the gravelly oval soil was removed and replaced with good quality loam; lawn seed was planted.

The narrow strip of land (70 metres long) between the curbing and the paths near the school presented some problems: (1) access for the children would be required from the school building to the oval, and (2) a difference of 6 to 8 feet in levels of the oval and the paths.

We observed the likely paths that the children would follow and then planned to make a number of sets of steps to the oval After much discussion it was decided to convert a waste area into an amphitheatre. A great deal of planning was needed to organize all the details. Paving bricks, railway sleepers, steel posts, bolts, cement, gravel, sand, etc. had to be ordered for a full-scale working bee. Jobs were delegated to various parents and teachers and the mammoth task was tackled. Two sets of steps were built, a large amphitheatre and much terracing of the area was done by using large rocks and railway sleepers.

At the suggestion of a parent to sell bricks to be autographed, a phone call was made to a local brick manufacturer and a thousand "green" bricks all wrapped in plastic were delivered. For the next two weeks children, parents, staff and interested friends were busy writing on the bricks. This project aroused a great deal of interest and brought visitors into the school.

The circular paving of the amphitheatre is most attractive. An area of garden near the amphitheatre has been designated a Callistemon Garden. A retired teacher who helps with the horticulture programs on a regular basis suggested planting a "Bottle Brush" garden. He spent many enjoyable hours visiting plant nurseries to get as many varieties and colors as possible. At the present time he has selected over 50 plants, with 30 species and colors ranging from yellow, green, pale pink to deep red.

Just as the physical development of the Sebastopol School has been evolutionary in nature so have the environmental activities associated with the school curriculum.

Camping, excursions to local creeks, dams, lakes and forests, interstate school exchanges, horticulture/gardening experiences, participation in local reforestation programs and various components of the school social science, science, health, physical education and art programs are all providing experiences and learning situations in the environment for children of Sebastopol. In order to capitalize on the experience gained, the school is now ready to develop the Environmental Education element to the school curriculum. It is not envisaged that such an element will add another "subject" to the curriculum but will unite and give purpose to the activities already in use or in the planning.

The aim of the Environmental Education Program is to give the children a greater understanding of themselves. In understanding themselves, children should be able to see their position within their class, family, local, Australian and global communities, and also be able to see the relationships of people to their surroundings and the interaction of the various components of the environment.

Environmental Education is not an "in" thing at Sebastopol, it is a logical conclusion to the evolutionary development of the school buildings, community and school curriculum. It has provided the opportunity for children to be involved in working together, serving their community, and in the making of real decisions regarding their environment.

COMMUNITY-BASED SCIENCE PROGRAMS FOR ABORIGINAL SCHOOLS

by Steven Davis,* John Harris,** and Stuart Traynor***(Australia)

Aboriginal people are concerned about their own future and that of their children. They are concerned about their children's education and the perpetration of traditional knowledge and skills associated with their environment. The authors argue that any program of science education for Aboriginal schools should be community-based. This requires the direct involvement of Aboriginal teachers and the eliciting of information from the community. Furthermore, it is argued that traditional Aboriginal knowledge of the environment should form the content from which is developed learning skills, scientific process skills, and those appropriate European concepts deemed essential for life in the wider community.

'The world is my laboratory' may be a well-worn cliche. However, in Aboriginal schools, where complex science resources are often unavailable and, what is more to the point, usually inappropriate, it holds the key to a successful science program. Aboriginal people possess a vast amount of knowledge of the natural world and their particular environment. Non-Aboriginal science educators have the opportunity to utilize this knowledge. It is proposed that scientific process skills be taught using the Aboriginal knowledge of their environment as the conceptual and organizational framework.

A number of assumptions underlie this proposal;

1. The opportunity should be provided for Aboriginal students to investigate and understand essential process skills and key concepts of European science just as this opportunity is provided in European schools.

2. A core curriculum can be successfully defined in terms of learning skills and process skills (e.g., observing, imitating, hypothesizing, etc.) just as it can be defined in terms of key concepts (e.g., energy, interdependence, matter, etc.).

3. In European schools the core curriculum, no matter how it is defined, is made meaningful by reference to the familiar world of the students and by its links to the European knowledge system.

4. In Aboriginal schools, science can also be made meaningful by reference to the familiar world of the students and by linking it to other Aboriginal knowledge.

5. In the teaching of European concepts to Aboriginal students, careful attention needs to be paid to the students' existing conceptualizations about how the real world operates (John Harris, 1978).

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The community-based science program is planned around the seasonal variations in the local environment. Aboriginal people identify a number of seasons in the year, not only in terms of the weather, but also in terms of biological events. Seasonal cycles have already been identified for a few northern coastal communities and represented in calendar form. These calendars reflect what is happening in each community at any one time of the year. (The activities the people will pursue are closely tied to events in the cycle.) To date, no calendars have been drawn up for Central Australian communities, where seasonal variations are less predictable and distinct. However, it is likely that the idea of approaching science through a seasonal calendar will still be as valid for Central Australia as it is for the northern coastal communities.

Figure 1 shows a simplified calendar based on Milingimbi data. The months of the year have been included in the calendar only for orientation purposes.

Seasonal Calendar

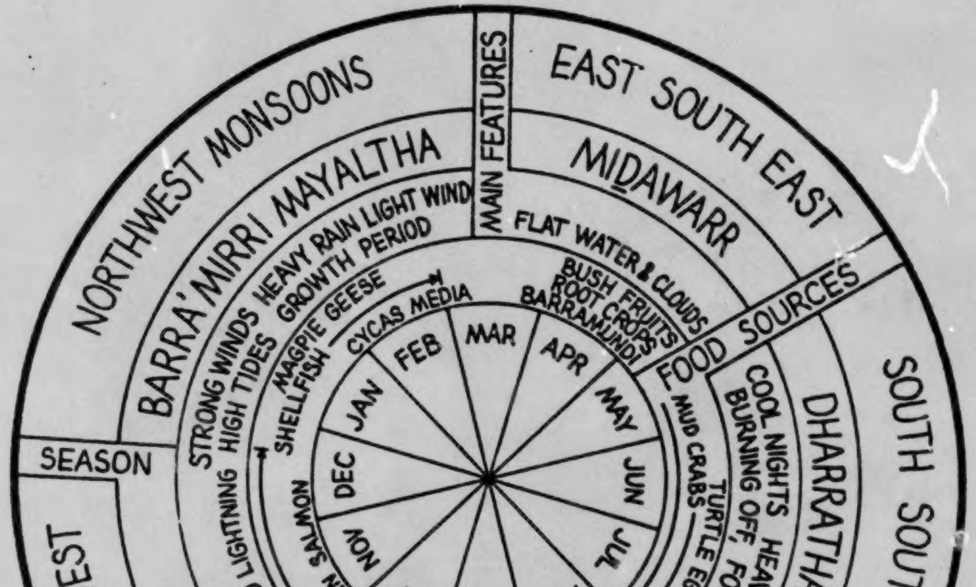

Figure 1

The Seasonal Cycle as a Curriculum Framework

How the key events and activities within a seasonal cycle as shown on a seasonal calendar can be used as the starting point for a community-based science program is shown in Figure 2. (The diagram is not intended to represent a full year's teaching program. It is simply intended to show how seasonally determined activities can form the starting points leading on to development of progressively more complex scientific concepts.)

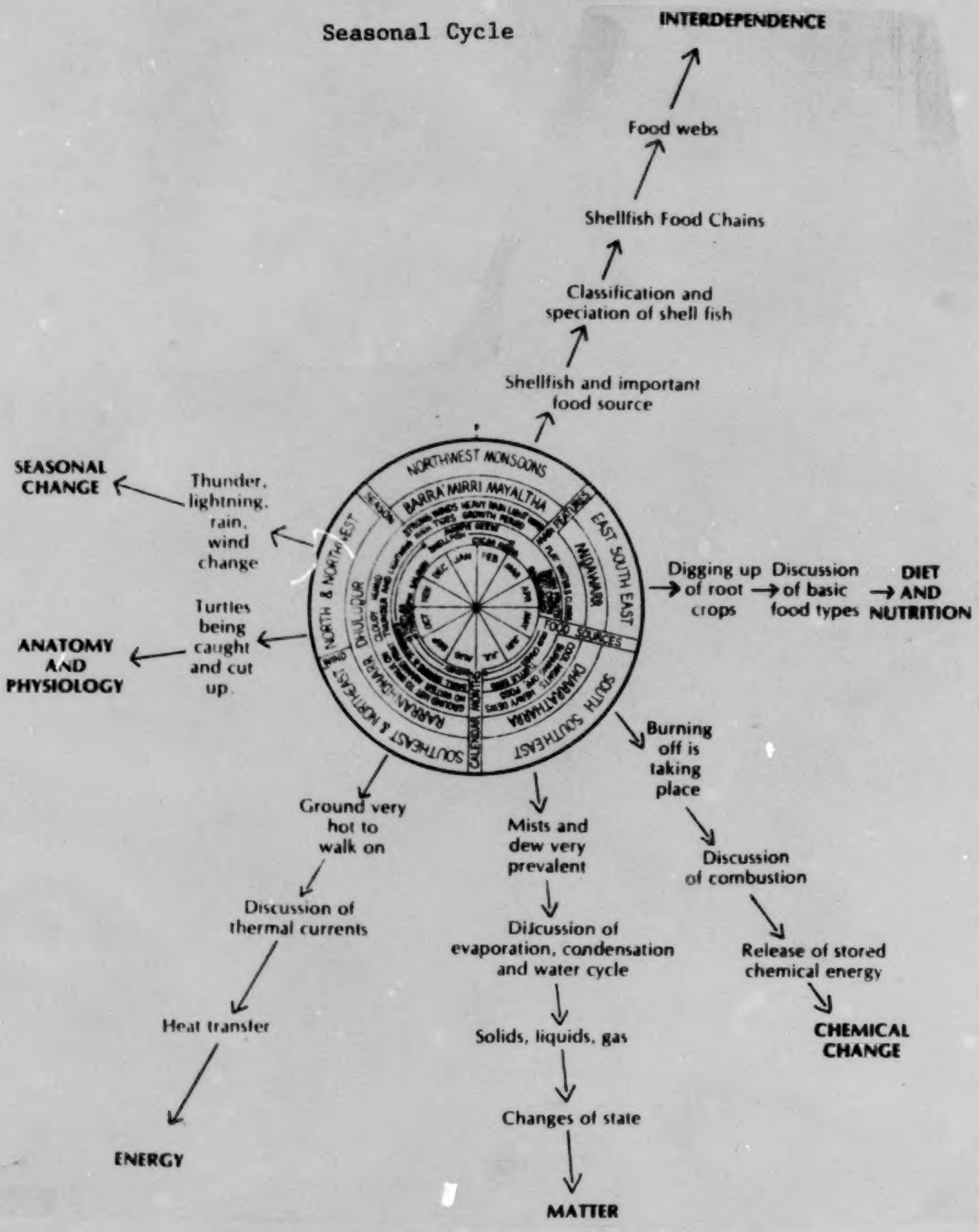

Figure 2

There are three principal advantages to be gained from such an approach to science:

1. In selecting topics for study, the teacher is able to capitalize on the interests of the community at a particular time.

2. This approach ensures that learning activities in the classroom are relevant to the students' activities outside those four walls and to the daily conversation in the camp at the time.

3. The lack of the materials and equipment available to science teachers in urban high schools can be counteracted by the thoughtful use of specific local resources as they become seasonally available.

Nonetheless, it must be noted that science education goes far beyond a simple treatment of relevant topics at appropriate times of the year. Science education is also very much concerned with learning strategies and process skill development. In addition, setting up a program of science education for Aboriginal Schools involves eliciting information from the community and involving Aboriginal teachers. These two factors are essential, partly as a means of discovering the existing conceptualizations of the students and also as the means of ensuring that the program is truly community based.

Aboriginal Learning Strategies

Recent research by Stephen Harris (1977) at Milingimbi has indicated that there are definite differences between traditional Aboriginal learning strategies and the strategies employed in European schools. The European teacher in an Aboriginal community needs to be aware of these differences:

1. Aboriginal children are orientated towards learning through observation and imitation rather than through reading, writing or verbal explanation.

2. Aboriginal children need to be actively involved in the learning process. Personal trial and error is a key strategy rather than verbal instruction and demonstration by the teacher.

3. The setting for learning is crucial. Aboriginal children are accustomed to learning through performance in a real life setting rather than in a contrived setting, such as is often the case in the classroom. (This necessitates that much of the science program be conducted in the community and surrounding bush.)

4. Aboriginal learning is characterized by mastery of context-specific skills rather than context-free principles. This poses a problem for European teachers because European science curricula tend to be concerned with concepts and principles which are free of any specific context.

5. Aboriginal learners are person-oriented rather than information-oriented. This means that the giver of the information is often valued more than the information as such. (It has been observed that how much an Aboriginal child learns in the classroom will depend on the view he holds of the teacher.)

Process Skill Development

Research by Bradfield and Moredock (1957) has led to the recognition that a number of levels of performance exist in relation to process skill development. These levels are:

Level 1: Observing, imitating, duplicating, repeating;

Level 2: Recalling, recognizing, identifying, classifying;

Level 3: Comparing, contrasting, discriminating, relating;

Level 4: Reformulating, illustrating, explaining;

Level 5: Justifying, estimating, predicting, interpreting data, making critical judgments; inferring;

Level 6: Hypothesizing, questioning, problem solving.

Levels 1 and 2 correlate with traditional Aboriginal learning strategies, as identified by Stephen Harris. Any program of science education for Aboriginal children should be firmly grounded in these process skills. However, this does not mean that the child be restricted to operating at these levels of performance. The learner can later progress through stages where he will learn to classify, compare, contrast, discriminate, reformulate, estimate, predict, infer, question and hypothesize.

However, as Western Science emphasizes these later levels of performance rather than the earlier levels, teachers of science frequently tend to neglect or else quickly pass over the early levels. They fail to recognize the importance of providing Aboriginal children with a firm grounding in these early levels. It is not surprising then that the child may have difficulty in handling a learning task set by the teacher.

In formulating a science program for Aboriginal schools we need to take note not only of the learning strategies characteristic of the Aboriginal students but also the learning process inherent in mastering the various levels of performance that the students are expected to pass through. A consideration of how students learn science cannot be divorced from what science they learn.

Eliciting Information in an Aboriginal Community

Outlined below is a short account of one European teacher's attempt to implement a community-based science education program at Milingimbi. It vividly illustrates some methods of eliciting information from the community, involving Aboriginal people and the use of Aboriginal learning strategies. This case study also vividly illustrates the problems inherent in such an approach.

The mangroves were chosen as an area of study because:

1. They were in close proximity to the school;

2. Shellfish associated with the mangroves were an important food source at that particular time of year; and

3. The mangroves were close to the camp area where most Aboriginal people in the community lived and hence the community could readily become aware of and participate in the study.

At the outset of the study, some students knew one or two specific names for mangrove plants. But their concept of the structuring of the mangroves was more one of an amorphous area of trees rather than a succession of speciation zones.

The study started with a class discussion about a place where some of the boys had been fishing with their spears late on the previous afternoon. The boys had been fishing around the edge of the mangroves while women and older girls had been gathering shellfish around exposed rocks and on the mud flats.

The class discussion yielded the information that it was not uncommon for larger fish to be found in the shallow water around the mangroves on an incoming tide.

A discussion was made with the class to investigate the mangrove habitate near Top Camp. Aboriginal people living in Top Camp were asked for their consent for a class visit to the mangroves near the camp. They were consulted as to any prohibitions the class might be subject to and the manner in which the class should proceed. It was significant that the students and their teacher made contact with the community at this point and that the community was made aware of the work the students would be engaged in.

Early the following morning at low tide, the class gathered at school and then proceeded to make their way to the mangroves. (1. At the outset, the students followed their teacher with only minimal questioning as to the proposed destination. They were easily satisfied with a simple answer such as: "We are going to the beach." Aboriginal children readily accept such answers and normally do not pursue complex explanations.) The class made their way to the mangroves via the beachfront in order that the people of Top Camp would know that the study had actually commenced. (2. By making it possible for the older people to view the progress of the group, the teacher was confirming to the older Aboriginal people in the camp that he held a positive view towards their position in the community and respected their wishes.)

The initial excursions into the mangroves was limited purely to observation whereby the students were able to experience the mangroves free of imposition of values or perceptual limitations by their non-Aboriginal teacher.

Later the same day, the teacher approached people in Top Camp and explained that he knew very little about the mangroves. He asked if someone would help him find out some things about that particular habitat. He was immediately directed to an older Aboriginal man whom, he was told, knew a good deal of information about the mangroves. The area of the older man's camp was approached and the teacher waited until he was invited into the camp. After exchanging pleasantries, the teacher stated his business at which point the older man immediately started to relate stories about the mangroves. (3. Aboriginal people are heavily present-time oriented rather than future oriented and so, as the teacher had expressed a need, the older man immediately set about to meet the need.)

After some time, the older man had related his stories. (4. Aboriginal people do not attempt to speak over one another or to cut in on another person in order to make a point as Europeans are accustomed to doing. In the company of other Aboriginal people, an Aboriginal person may fully expect to be heard until he concludes his point. A European who interrupts may be confronted with a sharp rebuttal, as he has not shown the respect due.) The teacher then asked if some of these stories could be told to the students in his class. The older man replied that it was quite in order for the students to hear these stories. Arrangements were made for the class to visit the old man the following day. (5. Making arrangements for a later time is a common method of avoiding a situation of possible confrontation among Aboriginal people. Here the teacher ran the risk that the older man may not have interpreted the teacher's statement as one of not wishing to become further involved.)

The students went down to the mangroves again the following day. Again they walked along the beach so as not to impose upon the daily life in the camp but still be noticed by the community. On this excursion the teacher had some background information given by the older man and so was interested to see what the students knew about the mangroves. While making their way through the mangroves, the teacher occasionally asked the students the names of various plants and molluscs. The students were sometimes embarrassed at questions to which they had no answer. (6. The teacher asked the questions of the students. Hence they felt they were expected to know the answers, resulting initially in embarrassment for the students. Although the students overcame this embarrassment and later volunteered information, this information was often erroneous as the students were supplying information because they felt they were expected to.) However, when the students realized that their teacher was anxious to learn any information he was told, they were soon volunteering information in a more positive manner.

The students and their teacher returned from the mangroves and made their way to the older man's camp. When the students asked where they were going, the teacher told them, only to find that some of the students refused to go any farther. They felt uneasy about that part of the camp as it did not belong to their tribe and they had no claim to be there.

The teacher asked the students to wait in the shade of a Tamarind tree on the beach while he sought advice. He approached the older man's camp and explained the situation. The older man and some of his wives and family assured the teacher that it would be all right to bring the students into his camp. The teacher returned to the students and relayed the information. Some students firmly refused to go any closer, so they were assured that it would be all right to wait under the trees while the remaining students went into camp.

After the old man had related the stories, the teacher asked if someone could come down to the mangroves with the class and tell the students and himself the stories related earlier. (7. Each adult in an Aboriginal community is a teacher in his own right. Not only did the older man and his family see that the European teacher realized this, but their self-concept was enhanced when the teacher was willing to become a learner to their teaching. This was a very important step for the European teacher in establishing rapport with the Aboriginal community.)

The old man replied that he was too old but immediately suggested a younger man in his family who subsequently accompanied the class back into the mangroves. (8. The older man who had particular "rights" to the information concerned with the mangroves conferred the task of relating information to the students on the younger man who had secondary rights to the said information. The younger man eagerly accepted the task and immediately joined the class as the "new teacher.") The younger man walked through the mangroves naming trees as he passed them. The students walked behind the younger man, taking note of the trees he pointed to which the teacher repeated to himself. (9. Aboriginal people are, on the whole, passive learners, rarely acknowledging information being conveyed by nodding the head, saying "Yes, yes," or "I see," or "I understand," or repeating excerpts of the information, as Europeans are accustomed to doing.)

While emerging from the mangroves, the teacher tried his hand at the names of several trees as he pointed to them in turn. This served to greatly amuse the class and the younger Aboriginal man. Although the teacher's ability to associate Aboriginal labels with the appropriate species of trees was anything but good, the younger Aboriginal man praised his efforts in anecdotal style to the old man's family. Much laughter and joking followed to which the teacher amiably responded.

The following day saw the class, accompanied again by the younger Aboriginal man, return to the mangroves. The European teacher again accompanied the students as a learner and the younger Aboriginal man took on the role of teacher using traditional Aboriginal strategies. (10. At this stage, the students were learning mainly by observation, imitation and duplication.)

On subsequent excursions in the mangroves, the students collected specimens of each type of plant occurring in the mangroves and took them back to the camp for teaching sessions with older members of the community. The number of Aboriginal people interested in what the students were doing had grown. Many people in the community were willing to assist the class and be available for advice and offer information where required.

In the initial teaching sessions with older members of the community, students were mainly presented with the name of each specimen collected. The specimens were then taken back to the classroom where the camp lesson was repeated with the students taking turns at giving the instruction in identification while the teacher made notes. Students made drawings from the specimens and recorded their information on display boards to be used for further reference and as stimulus material.

(In the next phase the students moved from the level of simple observation and recall to classifying, comparing and contrasting.)

The next visit to the mangrove habitat was more structured. (11. Students were learning in a real life situation rather than in a contrived setting. See Harris, 1977.) Students walked along a transect line from the high tide line on the beach through the mangroves, to the water's edge at low tide. As the students passed along the transect line, they called out the names of the trees. When they broke through the mangroves to the seaward zone, the teacher asked the students which were the first trees they had encountered as they moved in from the beach. The students collected specimens as the procedure was repeated back through the mangroves to the beach.

The specimens were again taken back to the classroom where a transect of the mangroves from the landward zone to seaward was drawn to scale, using an overhead projector, in order to fill one wall of the classroom.

The class then simulated the situation of walking along the transect line, noting who had a specimen from the first group of trees to be located, who had a specimen from the next group of trees, etc. (12. The teacher soon realized that leaves were not the only criterion used to name and classify trees; bark colour, texture, root systems, type of fruit, colour and size of flowers were the major criteria used.) The students drew trees on the transect to represent each separate species. The drawings were very stylized along European lines and so it was decided to stick the specimens on the wall chart to ensure identification. (13. Specimens were then sorted and classified with criteria of classification noted and opportunities used to introduce mathematics terms and concepts wherever possible.)

(The transect line had formally been established in the mangroves by driving a post into the ground at the mean high water spring tide (MHWS) on the landward zone and another post at the mean low water spring tide (MLWS) line. The two posts were then connected by a string which the students had marked off in metres. They used an orange dye made from the bark of one of the mangrove trees to colour a centimetre of the string at each metre interval and tied some brightly coloured plastic ribbon at each 10-metre interval.)

As the students moved along the transect line, they counted off the distance from MHWS to each zone of vegetation and noted any other features such as rocks, shellfish, and areas without vegetation. This information was then transferred to the mangroves wall chart in the classroom. Black and white photographs of the leaves, root system, bark, and general habitat of each species of trees were blown up and pasted on the wall chart. (14. The distinguishing features of each plant were blown into large black and white photographs showing details.)

To establish a vertical scale for the wall chart, students measured the height of trees by triangulation. The measured heights for each vegetative zone were then transferred to the wall chart. The students found that the horizontal scale used was not appropriate to show vegetation. So the measured heights of the vegetation were then noted and students graded the plants from largest to smallest. The students then agreed upon a scale by making a transparent overlay of each species of tree and projecting it onto the wall chart such that it portrayed the height ratios evidenced in a large black and white photograph of the mangrove. (15. There was an opportunity to discuss the concepts of proportion and ratio using comparative terms and superlatives.) Members of the community with whom the class had consulted earlier in the study were invited to the classroom to see and discuss the students' work. Initially puzzled, the members of the community began to understand the wall chart portraying the mangrove transect as they recognized the specimens and identified the photographs. (16. Another method of checking information was showing 35 mm. colour slides in the camp at night. As people responded to the slides, the information was checked, much to the delight of the audience.) This served as an opportunity to check the information gathered by the students and inevitably led to an impromptu lesson from some of the older Aboriginal men. It was important that the students did not stand up and openly explain their work to the older people. This could upset the older people who could see this as a display of lack of respect and a threat to the Aboriginal social order. (17. It was also important that members of the community experience part of the program so that they might fully understand it.)

While some of the older men were relating information about the mangroves, the teacher made notes on the chart. The men could see that the teacher was interested in what they had to say and were confident about what he was doing with the information. However, realizing that non-Aboriginal people often have a different understanding of things, they allowed him to question them in areas which may have seemed inconsequential to them. (18. The men had become more confident about what the European teacher was trying to do and so agreed to the questioning.)

The information from the classroom visit was used to supplement the running records of birds, reptiles, fish, insects and crustaceans which the students had noted from the outset of their study. This information was reformulated and drawn together into simple food chains involving birds, crabs fish, etc., which were then located on the mangrove transect. As the students worked through the food chains, various connections were made between various food chains and complete food webs soon developed.

It became obvious from the wall chart of the transect that a definite pattern of zonation existed. Within and across these zones, microhabitats were evident. (19. Students were questioned about their experience of the mangroves and the teacher made extrapolations from the students' experience.) This led the students to examine temperature variations in the different habitats and zones by attaching thermometers to trees, taking sediment samples throughout the transect, measuring the depth and duration of tidal inundation, etc.

The community offered assistance wherever required and were keen to support the work of the class when they decided to more closely examine the shellfish of the mangroves and associated mud flats. The students spent many sessions gathering shellfish from the habitats which they had identified on the wall chart transect.

Girls accompanied older women when gathering shellfish. (20. Learning by imitation and observation through real life experience.) The shellfish were identified, sorted, and their habitats noted. They were then counted and weighed before being cooked. The numbers of shellfish collected were graphed. After the shellfish were cooked, the students ate the meat and weighed the residual shells, the weight of mean per species was also graphed to determine which shellfish were most profitable to gather. Other factors such as the amount of time each shellfish habitat lay exposed from the sea and the area of each habitat were also considered. Measurements of tidal inundation were made and the resultant change in the area of various habitats still exposed was calculated. Palatibility was also taken into account, leading to opportunities to develop social surveys and consider the effects of human intervention in food chains and on the environment as a whole.

The major aspects of the mangrove environment included in the module are summarized below:

1. Vegetation. Identification, zonation, adaptations, structure;

2. Animal life. Identification, associations of animals and plants, life cycles, adaptations;

3. Physical features. Creek and open water habitats, tidal inundate (depth and duration), slope of land;

4. Climatic conditions. Temperature variation, evaporation, wind strength, wind direction, storm activity and

5. Growth factors. Salinity, soil type, inhibitory factors (such as human interference).

Conclusion

The purpose of this paper has been to argue that programs of science education for Aboriginal schools should be community-based. It has been argued that, rather than simply transplanting a European curriculum framework, the teacher can use the local seasonal calendar as the framework for introducing concepts and process skills. The need to take careful note of traditional Aboriginal learning strategies has been emphasized. Finally, ways of involving Aboriginal teachers and eliciting information from the community have been outlined.

The authors believe that setting up a science program like the one outlined in this paper is within the grasp of the average European teacher. The key to it is essentially to involve and be involved with the Aboriginal community.

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GARDEN SETTINGS FOR ENVIRONMENTAL EDUCATION: CASE STUDY ONE, COMMUNITY GARDENING IN METROPOLITAN MELBOURNE, AUSTRALIA

Introduced by Dr. Peter J. Fensham*
Case Study by Sally Jeavons**

INTRODUCTION

Environmental education takes many forms in the Australian states and territories. In a country that is the world's largest island, just less than the U.S.A., the range of natural environment is immense. Tropical areas in the north, deserts in the west and centre, and an alpine area in the southeast that for a few months each year has more snow cover than the whole of Switzerland. However, despite its vast land areas, most of Australia's 14 million people (nearly 80 percent) live in the 8 or 10 metropolitan cities that serve as the capital cities of the separate governing areas that make up the Commonwealth of Australia. As far as its people are concerned, Australia is thus one of the most urbanized nations in the world.

This fact is a great challenge to environmental educators since many of the environmental issues that have surfaced in the last decade in Australia have been concerned, as in many countries, with the conservation of features of Australia's natural environment, remote regions like wild rivers in Tasmania's southwest, fragile coastal regions like Coorong in South Australia or Cooloola and Frazer Island in Queensland, remnant rain forests, and various endangered species. There has been much environmental education in schools and in the less formal scene concerning these issues, but they are not close to the regular environments of most Australians. Education for, about and in urban environments is being tackled but proportionately it is still much underrepresented.

The two case studies on community gardening and zoo environmental education that are briefly reported in this volume were deliberately chosen to portray programmes of environmental education in metropolitan Australia. To appreciate the report by Sally Jeavons on urban community gardens, one other feature of Australia needs reference. Prior to 1950, Australia's white population of about 8 million was predominantly Anglo-Saxon in origin. The great majority of families had their roots in the countries of the United Kingdom. The black aboriginal population of about 100,000 was distributed away from the major metropolitan concentrations.

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In 1950 an immigration policy was launched which in 30 years has changed the character particularly of metropolitan Australia. These immigrants now amount to more than one-third of the population and over half of that number has come from non-English speaking countries. There have been waves from eastern Europe, from Holland and Germany, from Italy and Greece, from Spain, Malta and Turkey. In the 1960s immigration from a number of Asian countries became significant and by the 1970s South America and Southeast Asia began to become familiar countries of origin. The ethnic mixture is now very rich, but such a multicultural scene has its complications. Many of these immigrants were rural people in their countries of origin but now they are urbanized Australians. Community gardening is an action programme full of potential for environmental education.

CASE STUDY

In 1980 a Vietnamese man living on Laydon Park Housing Estate in Richmond (an inner suburb three miles from the centre of Melbourne) expressed the need for a vegetable garden. The vegetables the Vietnamese are accustomed to eating are not readily available in Melbourne and without backyards it is difficult to grow them. It was through the man's insistence and with the Tenants' Council's support the Ministry of Housing made available a small area, previously lawn, for a community vegetable garden.

The majority of persons now holding plots are Vietnamese or Turkish and the style of gardening is very different. The Vietnamese grow mostly herbs and narrow ordered plots. Hot mint, purple basil and lemon grass appear in most plots. Plants which are cut vegetatively and used in salads are also popular; for example, a plant from the sweet potato family and another from the arrowroot family. Just recently another plant has been grown, which has been called "winter vegetable" and is not unlike the wild garlic my grandmother grew to keep flies away. Yams are another popular crop and marigolds in tubs are used as pest inhibitors.

Beds are carefully laid out with brick or bottle borders and the method of agriculture is not unlike paddy-farming. Because the beds are constantly wet several devices for allowing the gardeners to weed and harvest as they perch above the plot have been adopted. An old car pack rack appears to suit the purpose admirably.

Turkish gardens have become more than a place to grow vegetables. It has become almost a point of social contact for many whose means of expression are generally constrained by their new environment. The garden is also something into which positive energies can be put and choices can be made about it. It is an environment which can be identified with. Some old chairs have appeared in the garden enclosure and long hours have been spent painstakingly making decorative borders from rubble extracted from the soil.

The social contact between the ethnic groups is positive even though there are initial differences such as standards of gardening. Gardening is the common language and the vehicle for community and environmental education. Cultures are enabled to become familiar with other cultures in a manner of ways, where the ethnic groups are seen in context with their environment and not displaced.

Similarly, passersby may take a look at foreign methods of agriculture, see tropical vegetables growing easily in Melbourne, or an individual's approach to gardening, or they may simply enjoy the sight of a garden in the city.

In Fitzroy, another inner suburb, a community garden association was formed in 1979. In the following year, two sites were established as community gardens. These are the closest community gardens to the centre of the City of Melbourne, only 2-1/2 miles away.

Over 40 percent of the plot holders are high-rise dwellers from neighbouring Housing Commission estates. A large proportion of plot holders are of Turkish, Yugoslav, Spanish, or Greek origin. Many of the persons from these ethnic groups come to the garden as families and therefore there is a wide variety of age groups commonly present at the same time.

Children have a cubby house made from old car boxes on the site. With a few odd toys, they are often found playing in water, in dirt or helping Mum.

The routines followed by the different cultures is again interesting in Fitzroy. The Australians of long standing do not tend to spend time in the garden over and above time required for essential duties such as weeding, watering and harvesting. Turkish gardeners seem to spend more time at the garden and with immediate family and relatives. A group of women often put down a rug and sit long into the afternoon sewing and knitting. A popular pasttime seems to be painstakingly hemming scarves. The quality of work is impeccable. The men folk seem to just walk around or chat to the others who have flower gardens.

The gardens are all very different. Many of the Turkish women seem to just throw down seed and stamp it in with their heels in no specific pattern. This method initially was met by scepticism on the part of many until it showed an equal success rate to established Australian methods.

Some gardeners still till and terrace their gardens. It seems to be a method which belongs to a former situation, yet it is perhaps relevant to some plots with high clay soils.

There is a chook club and they have a number of laying hens and a rooster. Eggs are only collected by the person rostered to feed and water on that day.

This garden, like the Richmond garden, serves as a point of contact for many of these families of foreign origin. Working bees are held occasionally and the association has a newsletter which is translated into the languages of the gardeners. A major problem here is that many of the Turkish women cannot read their own language and therefore communication has to be verbal. In this context these women tend to be cut off even from their own culture in Melbourne; the garden may help to overcome this. At the same time, they are able to show the community their ability to contribute their expertise which may be disguised most of the time by the lifestyle they are forced to live as fairly new citizens of Australia.

There are other community gardens in Melbourne and several in the process of being established. Space prohibits me from describing these in any detail; however, perhaps it is pertinent to point out that community gardening is not a new concept. As early as 1819 in English cities it became mandatory to set aside allotments for the unemployed and poor. Since 1970 interest in community gardening has become apparent in many countries. England now has over one million allotment gardens. Germany has 500,000, and Switzerland and Sweden 35,000 each.

This decade saw the inception of the city farms movement in the United Kingdom. This was aimed at promoting the idea of community gardens and small-scale farms in the inner city. There is one in the suburb of Collingwood, about four miles from Melbourne centre. City farms differ greatly but all utilize vacant or under-utilized city land. Most incorporate community garden plots and farm animals, and they are often associated with an adventure playground, a picnic area, or other recreational facilities.

Generally, city farms are educational and recreational projects which aim to:

(a) Develop community awareness of agriculture, horticulture, homecrafts and related subjects.

(b) Provide opportunities for city persons to participate in rural pastimes otherwise not available to them.

(c) Provide remedial or therapeutic recreation through agriculturally oriented projects.

(d) Better utilize vacant or poorly utilized land.

(e) Provide a pleasant setting for informal recreation.

(f) Contribute to the "greening" of cities.

(g) Enable persons of all ages and abilities to realize creative potential and to work together towards a common goal.

(h) Enable persons to reduce the cost of food items.

The aims of the community gardens in Melbourne, although not often spelled out so clearly as those above, are essentially the same when the participants talk about them.

It is interesting to note that some of the more recently established community gardens wishing optimal community participation advocate that separate garden allotments are antisocial and elitist; they opt for cooperative units to work an area jointly and divide their produce as seen fit.

From examining trends in community gardening, I suggest that four things are evident:

1. Community gardening fulfills a basic human need to nurture growing things and maintain contact with the "natural environment" in persons who are alienated from that environment by their place of residence or condition in life.

2. Community education and recreation projects such as community gardens will assume a greater importance in a post-industrial society where productive use of leisure time becomes a critical issue.

3. With increasing density and diversity of populations, there is a need for urban recreational resources to promote environmental education and opportunities for persons of all ages, abilities and nationalities to work together. This is particularly important where children are concerned so that they may learn to cooperate with older folk with whom they may generally have no contact. Hence, they may learn basic motor skills, and on the way absorb information in related subject areas (i.e., nutrition, ecology, etc.) as well as experience the responsibility of looking after something.

4. Gardens have been, for adults, a vehicle for the exchange of ideas about plant materials and cultures. In inner Melbourne, they have also become a medium through which local issues can be addressed and new realities can be shaped.

A CASE STUDY OF ENVIRONMENTAL EDUCATION IN THE OCCIDENTAL HIGHLANDS OF GUATEMALA

by Dr. Luis F. Capurro S.*

INTRODUCTION

All the countries in the world are facing environmental problems, so it is necessary to create consciousness about them and try to lead this into attitudes, behaviour and decision-making capacity that contribute to conserving and improving the environment, giving man a better quality of life.

Guatemala, a country situated in the Central American isthmus, accepted the challenge and decided to carry out a first attempt at including environmental education's purposes, objectives and goals in her educational plans. Four rural communities of the occidental highlands were selected; they have specific environmental problems due to the isolation caused by transport difficulties, and many of the traditional ways of cultivating the land and using natural resources still survive. It was thought that these communities would allow a good methodological treatment of rural environmental problems, also counting on the support of institutional health, nutrition, community development and agricultural and forestry development programs.

The project's aim was to train a group of teachers of these communities in the techniques and methods used in environmental education so as they could be used in everyday activities, enabling them to use the newly-acquired experience at a regional level.

METHODOLOGY

The specific objectives of the project were:

- —to know the fundamental social, psychological, economical, cultural and natural phenomena related to the environmental problems of the region,
- —to acquire experience in the scientific technological methodology used to solve the local environmental problems, and
- —to acquire knowledge and experience in the understanding and application of low-cost techniques suitable for contributing to the solution of local environmental problems linked to health, hygiene, nutrition and preservation of natural resources of that area.

The methodology used in the project comprised the design and carrying out of two educational modules to be used by the teachers involved as action models in the environmental education learning process:

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a. Module "Health, Nutrition, Hygiene and Environment," designed and elaborated on the basis of the following sub-units: "Health-Illness Concept"; "Man as Subject and Object of Health"; "Health and Environment"; "Health and Styles of Life"; "Organization of Health Attention"; and "Health in the General Development Setting."

b. Module "Natural Resources and Their Conservation," designed and elaborated on the basis of a continuous flow of contents since it was about more specialized subjects: "Natural Resources"; "The Organization of the Natural Environment"; "The Ecosystem, Organization of It"; "Human Actions on the Environment and Conservation Principles."

The methodology also comprised the organization of a seminar-workshop for the 56 teachers chosen to participate in the project. Their activities were planned following a self-capacitation methodology so as to create a personal concept by each teacher with the experiences related to the application of the environmental education's goals, purposes and objectives. The seminar-workshop lasted two weeks; it was agreed to assign 20 percent of the time to a strengthening of their concepts and theory and the other 80 percent to the workshop, which consisted fundamentally of personal experiences of the modules which were going to be used by the teachers.

DEVELOPMENT OF THE SEMINAR-WORKSHOP

The seminar-workshop took place in a retreat situated in the environs of Palin, a little town where the teachers had all the time and peace and quiet necessary to dedicate themselves completely to their capacitation.

The activities for the theoretical-conceptual strengthening included:

--An introductory talk on environmental problems; causes and consequences.

--A forum on a general methodology to do environmental education.

--A talk on environmental conceptualization, ecology and environmental science.

--A talk about development and its implications.

--Short talks about topics related to: health, nutrition, environmental sanitation, soil and erosion and highland ecosystems, that were inserted during the workshop part of the seminar.

The workshop consisted of personal contact as complete as possible with both of the modules, so that the teachers could accumulate enough experience to let them first adapt the modules given to them as a general guide to the learning situations in their own courses and to their own communities, and then try to create their own modules according to their own creative capacity.

As a way of starting the teachers off in the workshop, they were divided into seven smaller groups and after a forum about modular methodology, were invited to design and elaborate a mini-module on very specific short topics chosen by the teachers themselves.

The workshop activities were complemented by the short talks mentioned above, given by the specialists who helped us in the design and elaboration of of the two modules. The presence of these specialists during the workshop allowed them to reply to questions and doubts that sprang up during the acquaintance, on the part of the teachers, of the modules. The teachers were given the texts of the modules so that they could manage them better, both in the methodological and the content aspects.

After dinner a film on some ecological or environmental aspect related to the modules was shown, giving rise to a round table which helped to strengthen weak points in the teacher's professional background.

POST-PROJECT ACTIVITIES

The project considers as post-project activities the following:

a. Adaptation of the model modules by the teachers to their own local environments.

b. Technical assistance for the teachers on the application of the Environmental Education pilot project at their working places.

c. Coordination of the institutional actions relative to health, nutrition, community development and forestry and agriculture development that work in the community as a support tool in the identification and solution of local environmental problems.

d. Critical analysis of the two modules' preliminary versions used in order to improve and enrich them. This is done in a feedback process that obtains more definitive versions of these tools, with the aim of using them in other places of the country or in other countries of the region.

e. Application of an evaluation system for the teachers at their own working places so as to value their own experience.

f. Accomplishment of a meeting with all the teachers at the end of the school year, to analyze the results of the application of the pilot project in the schoolrooms.

g. To continue the capacitation of the teachers to let them work as monitors appointed to expand the environmental education activities in other educational communities of Guatemala's occidental highlands.

CONCLUSION

Although the activity calendar took up nearly all the available time, the teachers worked with enthusiasm and dedication. Their own personal experiences with the model modules was a decisive factor in the interest shown by them in environmental education's problems and methods. Even though there was not a lot of time and the teachers had a few deficits in their basic backgrounds, their teaching experience and their methodological knowledge, plus the responsibility with which they took the compromise, let them overcome the difficulties and acquire a certain degree of personal experience which we hope was useful to them in the post-project activities.

A STUDY OF THE HOME REGION AS A BASIS FOR TRAINING FOR GEOGRAPHY AND HISTORY TEACHING IN THE PRIMARY SCHOOL

by Lynn Hurry (Republic of South Africa)*

BACKGROUND TO THE STUDY

This case study relates to the work done by the author as lecturer in social studies (geography and history) at the Eshowe Teacher's Training School, Eshowe, Natal, Republic of South Africa. Eshowe Teacher's Training School is a training school for both primary and secondary school teachers. Most of the students are boarders who come from many different parts of South Africa.

In South Africa, the student teachers training for primary (elementary) school teaching in the Department of Education and Training undergo a training period of three years. At the completion of their training the student teachers will have to teach environmental subjects such as geography and history from Standard 4 (Grade 6) to Standard 6 (Grade 8).

At Eshowe Training School there was only one lecturer to teach both geography and history. (Civics is a section within the history syllabus.) It was this individual's task to teach both the contents and the method (didactics) of these two subjects.

The exercise in this study was compiled in an attempt to alleviate three problems

1. The students came from many different schools from all over South Africa. They had widely differing levels of knowledge and ability.

2. The training programme for student teachers was heavily loaded with a variety of subjects. Most lecturers in the so-called "content" subjects (geography, history, biology, physical science) complained of a lack of time to give their students the information and the guidance that they needed to be effective teachers.

3. A problem in many primary schools in South Africa was that history and geography (as well as the other content subjects) were taught as separate subjects (often by the same teacher) and that there was seldom any attempt on behalf of the teachers to integrate materials to present an holistic picture of the environment.

AIMS AND OBJECTIVES OF THE STUDY

There were five long-term aims for the study:

1. To develop in the students an holistic approach to learning.

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2. To develop philosophical bases for geography and history and to broaden these bases to include recognition of the interplay of phenomena in influencing the character of places or events.

3. To show the students, through personal experience, the value of fieldwork.

4. To show the students the potential of the local environment as a teaching resource.

5. To give the students practical experience of a study that they could use as a model when they were themselves teaching.

There were four specific objectives:

1. To equip the students with specific geographical and historical information.

2. To develop in the students a feeling for and an understanding of those concepts which are basic to geography and history.

3. To equip the students with specific research skills relating to geography and history. (For example, map drawing, statistical representation.)

4. To develop confidence in general research techniques.

To achieve these aims and objectives it was decided to involve the first-year students in an holistic study of Eshowe town. They were to investigate and study the geographical, historical and civic elements of the town which gave it its character. It was hoped that the students would see the relationships of the elements in Eshowe as a microcosm of the world outside, and as a result of this experience use every opportunity to use materials from both history and geography to create holistic pictures of the places or events being studied.

Although Eshowe town is an ideal size for the programme (population of 5,000 in 1975), it is suggested that the basic principles could be applied to teacher's schools in much larger (or much smaller) centres.

DURATION OF STUDY

Time seems always to be a constraint in teacher training. Ideally, this sort of study should take a full semester (six months). In most years this study was undertaken over a period of only six weeks.

For this reason it was not possible for the students to do all the research themselves, and more assistance had to be given them by the lecturer.

FIELDWORK

It was essential that the students had as much contact with reality as possible. In Eshowe it was possible to make a number of investigations on foot. Where things were too distant to make this practical, bus trips were made. At this time the route was planned to include a number of different aspects of the study.

During the six-week study period only two bus trips were necessary. They were not expensive since the distances involved were small.

HOW THE STUDY WAS ARRANGED

Step One--Mapwork

Maps reveal both the absolute positions as well as the relative positions of phenomena. They are an invaluable tool in an urban survey.

The students began the urban study by mapping details of Eshowe and the farmlands in its immediate vicinity. In mapping these details the students had an early acquaintance with the elements that they would be studying.

To save time the lecturer compiled an accurate outline map of Eshowe. A vertical air photograph and a map supplied by the local tourist office were used as reference material. The map was then reproduced and each student was given a copy.

The students were then divided into groups of four and asked to discuss (in broad outline only) what sort of geographic, historic or civic elements should be included on the map. The class as a whole then listed these elements with the lecturer ensuring that the more important ones were included in the list.

The class was then divided into six groups. Each group was given a section of the town to investigate, and field trips were undertaken to mark on the map those details that the students considered relevant. From these basic maps a single map was compiled from which all the students made copies. A key showing the three sets of elements was used. Geographic elements were coloured green, historical elements yellow, and civic elements blue.

For Example: Geographical Elements

a. Crops grown on the farms close to the town--sugar, vegetables sweet potatoes.

b. Transportation routes/facilities--railway line, main roads, airstrip.

c. Functional zones of the town--central business district, residential areas, industrial areas, recreational areas. protected areas (nature reserve), "other uses" (e.g., post office, hospital, police station, jail, sports, refuse disposal area).

d. Electricity supply--substation from the national grid and main power lines.

e. Water supply--dam and water purification works.

Historical Elements

a. The local Nongquai museum--An old fort now converted.

b. The local cemetery--A record of the past inhabitants of the town.

c. Street names that give the names of early inhabitants of the town, or which suggest their countries of origin. (For example, there are many street names harkening back to English towns. Many of the early settlers in Eshowe were from England. There are also a number of streets reflecting the presence of the native Zulus at the time the town was established.)

Civic Elements

The civic elements in the map reflect the controls over the town at the local, provincial and national levels.

a. Local controls--municipal offices, town hall.

b. Provincial controls--education department, traffic department.

c. State departments--police station.

Step Two--Detailed Studies

Time constraints are always present in teacher training situations. Ideally, the students should have done all the research for themselves. However, to save time, the lecturer was obliged to provide some of the information. In doing so he tried to ensure that as many sections of the work as possible had at least some student activity in them.

History

An abridged history of Eshowe was compiled by the lecturer and presented in a series of discussion sessions. It began with the first settlement of Zulu people (escaping the heat of the subtropical coastlands), sketched the arrival of various settler groups, outlined the events that affected life in Eshowe over the past 100 years and ended with the present-day town plan and town organization. Sources of information included the local museum, the town clerk, the local magistrate, several local personalities and popular books about the area.

Wherever possible information that the students had mapped was used as evidence of past events.

Geography

The geographical study began with observations and discussion of the physical environment. The relief climate, soils and natural vegetation were studied. Fieldwork and/or practical work was used whenever possible. The students ran a weather station which measured temperatures, pressures, rainfall, humidity, wind and cloud cover twice a day.

Interrelationships between these physical factors were explored and discussed.

Human activity in Eshowe was divided into four categories: agriculture, industry, transportation and communication, and "services," including electricity, water supply and garbage disposal.

a. Agriculture

The following elements were discussed in terms of their effects on agriculture (size of fields, crop yields, etc.): the physical environment and levels of technology (some people used traditional methods of farming, others used highly sophisticated methods).

A field trip was undertaken to a local sugar farm. To ensure optimum benefit from the experience a discussion was held before the trip, and each student was issued a study guide. The farm study was written up as a case study of a typical Eshowe farm. The use of maps and pictorial representation was encouraged.

b. Industry

The industries in Eshowe include a bakery, a light metal industry, a dry cleaner and a printer.

The industries were discussed in terms of:

--industrial location theory and why the industries were located in Eshowe, and at the sites that they were.

--the origin of raw materials, with emphasis on distribution of raw materials--e.g., wheat for the bakery coming from the temperate grasslands of the Orange Free State, paper for the printers coming from the paper mill near Durban, steel coming from the iron and steel works near Pretoria.

--labour requirements and how these requirements were met.

—markets (how far afield was the bread, the local newspaper or the tip-up trailers sold).

c. Transportation and communication

Working in groups of four, half the class investigated trains while the other half investigated road transportation.

Students studying road transportation spent a Monday morning at each of the three main roads in and out of Eshowe. By checking number plates they guessed the origin or destination of all vehicles. In the case of cargo vehicles, lists were made of the types of cargo carried. Maps, bar diagrams and other representative techniques were later used to show this information.

The students studying rail transportation spent Monday morning at the station. In addition to checking on trains themselves in terms of loads carried and destinations, they obtained information from the station master. As with the road transportation, statistical information was represented pictorially at a later stage.

During the study on transportation, emphasis was laid on the dependence of Eshowe on other towns and cities. Durban, the largest city in Natal, was found to be particularly important in supplying various provisions, while the importance of other towns in the Republic, some thousands of kilometres away, was also apparent.

d. Services

Water distribution was examined in detail. The school water supply was traced back from the taps to the local water storage dam. The water purification plant was visited and a map was drawn indicating the position of the pipeline which supplied water to the school.

The electricity substation to the north of the town was visited on the same day as the water purification plant. The dependence of South African towns such as Eshowe on distant sources of electricity was emphasized For example, the Caborra Bassa scheme in Mocambique, some 1,000 km. to the north, is one source of supply. Energy supplies in relation to population growth, industrial expansion, environmental pollution and other matters was discussed at length in the classroom.

Eshowe's garbage disposal presented a problem. At the time of writing most was dumped on the edge of the Dhlinza forest, a protected area of considerable beauty.

Environmental pollution was a problem. Streams were polluted and occasional burning polluted the air with smoke. The students were encouraged to consider various aspects of garbage disposal. Recycling and alternative means of disposal were discussed.

Civics

The students studied the three levels of administration and control, namely local, provincial and national. Class discussions included decision-making processes at the various levels, and administration and implementation of decisions. Flow diagrams were used to show the three levels of administration.

The role of individuals and groups in civic, social, political and environmental affairs was thoroughly investigated. Particular emphasis was placed on environmental conservation, which included the conservation of historical and cultural phenomena as well as that of the bio-physical environment.

CONSOLIDATION AND PRESENTATION OF MATERIAL

The students recorded all information in a looseleaf file. This enabled them to add or subtract pages at will. Material was written up as the study proceeded. The students were given constant guidance during lectures and seminars. They were encouraged to use original ideas in writing up and presenting material.

After the last activity the students were given a period of two weeks to complete the written record. The files were then taken in and evaluated. A mark was given for the file which was used as part of each student's record mark.

LINKS WITH STUDIES THAT FOLLOW

The Home Region study provided a wealth of information upon which the students and the lecturer could draw in subsequent studies.

Examples:

- --In discussing the philosophy of history and geography, the lecturer could draw on many examples from the students' own experience.
- --In subsequent projects and assignments, the lecturer could refer students to techniques and procedures used during the Home Region study.
- --In discussing relationships between elements in geography, for example between relief factors and micro-climates, the lecturer could draw on similar examples chosen from the Home Region study.

SUMMARY AND CONCLUSION

A study of the Home Region in the first year of teacher training serves a number of useful purposes:

1. It teaches the students about the local environment. The students become integrated with the environment in which they are studying.

2. The development of philosophies of geography, history and civics is based on practical experience. These philosophies, which include thoughts on the nature of each subject as well as attitudes towards it, can to a large extent be developed by the students themselves as a result of their "real world" experience.

3. The student teachers become familiar with research techniques. These are useful to them in further studies and may be adapted by them when they themselves are running fieldwork activities for their own pupils.

4. The students have learned something of the approach to both history and geography as separate disciplines. This will stand them in good stead in studies which lie ahead.

5. The students have acquired knowledge and developed concepts during their Home Region study. This will be useful in acquiring knowledge and developing concepts about other areas.

CHANGING THE FISHING METHODS IN A COMMUNITY: AN APPROACH TO ENVIRONMENTAL EDUCATION IN GHANA

by Dr. Hubert Dyasi*

In the fishing villages of Atebubu District in Ghana, fishermen use "Gamalin 20" as a fishing aid. "Gamalin 20" is a lindane-based insecticide produced in Ghana and used generally to kill insects on cacao trees. According to staff of a local nongovernment organization, the Association of People for Practical Life Education (APPLE), fishermen pour the poisonous insecticide into a stream and collect the poisoned fish floating on the surface downstream. Robert Russell, a technical director of APPLE, has stated that there is very little reliable measurement of the impact of this practice on the ecosystem. It is, however, clear that the poison overkills fish; there is a 10 percent annual reduction in the fish population. It is not only the fish that are affected directly by the poison, villagers downstream who use the water for drinking, cooking, and bathing, often complain of blurred vision, dizziness, and vomiting. Dwellers in nearby villages buy the poisoned fish for use in their regular diet; they also have similar complaints.

Two staff members of APPLE, Mike Awah and J. H. Sulemana, have developed a unique programme to educate residents in the district against the use of insecticides in their fishing activities. Initially, the programme focuses on a single village. They identify key people in the village, for example local cultural leaders and fetish priests. Cultural leaders play key roles in the lives of the villagers--they arrange cultural activities for entertainment and for education; through songs, dance, and drama they sensitize villagers to propriety or impropriety of certain practices in the community. The fetish priest is responsible for installing taboos and for the "purification" of livelihood activities.

The key people are then educated about the deleterious effects of the use of insecticides in the local fishing activities. This is one of the most difficult steps in the programme because in the eyes of the villagers and the key people, the use of insecticides is an efficient fishing method; it is inexpensive (the insecticide is supplied free by "middlemen"); it yields quick cash dividends; it is a popular fishing method that is also easy to use.

Before attempting to counteract these notions, the staff of APPLE gain access to the key people by establishing communication channels with them. Access and communication in the village result from mutual trust. To build that trust some staff members of APPLE live in the village until they are accepted as people who are genuinely interested in the welfare of the village. With the help of the key people in the village, the APPLE staff identify suitable cultural groups and run a one-day "school" explaining harmful effects of the use of "Gamalin 20" as a fishing tool.

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During the "school," alternative methods of fishing are examined and discussed and the most environmentally sound methods are recommended; a drama sketch to educate fishermen about the effects of the different fishing methods is produced and later performed for the general public.

Key people also help in the establishment and operation of a local committee. The committee is responsible for the proper conduct and supervision of the environmental education activities. For example, after early orientation activities, it makes arrangements for local policemen to educate people about legal implications relating to the use of "Gamalin 20" for killing fish (it is illegal to use "Gamalin 20" for that purpose); and health officers to give educational talks on the health hazards associated with the use of the insecticide as a fishing device, e.g., prenatal damage. The committee also ensures that relevant taboos and laws are not violated.

After a successful educational campaign in one village, the APPLE team moves to another village. It uses villagers from the successful campaign area to introduce and sustain the educational programme in the next community.

Although no systematic evaluation of this environmental education approach has been carried out, it can be described as promising. On the basis of "spot checks" on fishing activities where the approach has been applied, fishermen have abandoned the use of insecticides as a fishing tool. They continue to use alternative fishing methods long after the APPLE staff have left. In most cases, fishermen are willing to forego the free "Gamalin 20" in favour of purchasing nets. This preference is truly impressive when one considers the economic hardships confronting the fishermen.

The strengths of the educational approach adopted by APPLE can be summarized. It builds educational activities into existing traditional mechanisms that are recognized and respected by the fishermen; it uses local persons to teach others and thereby diminishes the likelihood of mistrust by the fishermen; it recognizes the logic and perceived necessity to use the insecticide, in other words it does not belittle the fishermen's pragmatism; it identifies honestly the costs of needed inputs into alternative fishing methods and allows the fishermen to arrive at acceptable compromises on their own behalf and of the ecosystem.

The next phase of the APPLE environmental education approach will involve extension of activities to other villages and the building of a viable support system for "converted" fishermen.

ENVIRONMENTAL EDUCATION FOR NOMADS: A TEST CASE IN KENYA

by Dr. Irma A. Allen*

"How did Adichare get in that box? I want to talk to him."

"So the plants here are different than in other parts of Kenya?"

"How many goats to buy a radio?"

These were some of the comments made by Rendilles after listening to the first of a series of environmental radio programs. Many of them were listening to a radio for the first time.

The Rendille are traditionally nomadic pastoralists, handsome Hamites, proud and free, who for generations have been subsisting on their herds of camels, sheep and goats, and who move with them seeking forage and water across a vast arid area in northern Kenya stretching from Lake Turkana to Marsabit and as far south as Laisamis. Their 'manyattas,' nomadic camps, consist of strong thorn enclosures within which the livestock are kept at night, surrounded by small huts consisting of poles, hides, and grass matting, which are easily dismantled and carried on camels.

But life is changing for the Rendille, as it is for other nomadic pastoralists, i.e., the Boran, Samburu and Gabbra, who also occupy some of the same area. In recent years two changes in particular are taking place simultaneously and are accelerating overgrazing and excessive tree cutting, and leading to desertification. First, there has been an overall increase in the human and livestock populations. Then people, with their livestock, are tending to settle around a few boreholes and wells. These settlements primarily offer water and security from inter-tribal raiding, and they become sites for shops, medical facilities, schools and outlets for famine relief. Unfortunately, they also become centres of increasingly widening cicles of denuded land, as the people graze their animals and cut thorn trees for building their 'bomas' (livestock enclosures).

The problem of desertification has reached such a magnitude as to threaten not only the survival of the nomadic peoples of northern Kenya, but also roughly more than half of Kenya's land surface, including 15 percent of its population.

The Integrated Project in Arid Lands (IPAL) was established by Unesco with financial support from the United Nations Environment Programme (UNEP) in 1976 with the aim of finding direct solutions to the most urgent environmental problems associated with desert encroachment and ecological degradation of arid lands. It forms part of the international Unesco programme, Man and the Biosphere (MAB), and is an example of the type of pilot activity that Unesco and UNEP, together with other organizations and a number of governments, are trying to promote to provide the scientific basis for the rehabilitation and

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rational management of arid and semi-arid zone ecosystems through integrated programs of research, training and education.

The study area is located in the arid zone of northern Kenya and consists of 22,500 square kilometers situated between Lake Turkana and Marsabit Mountain, including the Chalbi desert. The site was selected to be sufficiently large to be representative and to cover the major biotic communities found in the area, where major processes leading to desertification can be observed and studied firsthand. There are five field stations located at Gatab. Olturot; Kargi, Korr and Ngurunit, with the project headquarters at Marsabit.

For the past four years, IPAL scientists have been collecting data and building a comprehensive picture of the area with studies of climate, water distribution, soils, vegetation, wildlife, domestic livestock, traditional management practices, history, and socio-economic and cultural characteristics of the people. The work has been planned not only as a scientific inquiry into changes in an arid zone ecosystem, but also to seek modifications and possible alternatives to existing practices which could enable degraded grazing lands to recover. While still primarily a scientific study, the present phase of the project is more action-oriented, with emphasis on human ecology and on education and training. The aim is to develop and implement land use plans for this part of the world. At the same time, IPAL's results are being disseminated by publications, training and seminars to other countries with similar problems of desertification.

From the beginning, IPAL has been aware that any measures suggested to halt desertification will have to be made with a good understanding of man-environment relationships, and with the full cooperation of the people concerned. Any modifications to traditional livestock and rangeland management practices will have to be seen in the light of new attitudes and information about the environment. Therefore, it was essential to find an appropriate channel for communication and education to make the nomadic pastoralists aware of the desert encroachment, of their own impact on the environment, of alternative measures to improve productivity of the herds, and of other project findings.

A preliminary survey of means of communication in the study area produced a bleak picture. The nomadic pastoralists are largely illiterate, and they live in remote, generally hot, inaccessible areas. Roads are few and poor, and as a result there are limited extension services. Outside of Marsabit, there are no newspapers or telephones and only the occasional radio, usually located in a 'duca' (shop) within a settlement. There are a few two-way radios located in administrative police posts, missions, and at IPAL field stations. The usual means of communication appears to be through 'barazas' (meetings) of the elders usually called by the chief. When the chief wants to call a 'baraza,' or if an important message needs to be disseminated, this is done by sending a messenger who walks to the nearest 'manyatta.' From there, a new messenger then goes to the next 'manyatta,' and so on. In this manner, a message may travel 30 kilometers within 6 or 7 hours.

The survey indicated that radio could be a medium which had a chance of success. It would move with the nomads, and it would "speak" their language. The greatest limitation was that it was virtually untried.

Would the nomads listen to it? What credibility would it have? How would they know the time to turn it on for the program?

RENDILLE RADIO PROGRAMS: A TEST CASE

As part of the educational component of the IPAL Project, a test case was carried out to obtain a preliminary assessment of the use of radio as a means of communication and a channel for environmental education with Rendille nomads in the area. This involved the design, production, broadcasting and evaluation of a six-month series of environmental radio programs in the Rendille language. Each program was 15 minutes long and was broadcast via the National Broadcasting Service, Voice of Kenya, twice a week.

Objectives

The primary objective was to obtain a preliminary assessment of the use of radio as a means of communication and education in the area. The radio programs, in turn, were designed to:

1. acquaint Rendille-speaking people in the study area with the work of IPAL (Unesco), and help establish favorable public relations,
2. create awareness of environmental problems, specifically desertification, in northern Kenya,
3. introduce suggested measures, based on project findings, which are intended to help the Rendille improve the quality of their nomadic life,
4. foster positive attitudes towards conservation of resources,
5. sensitize decision makers in the area to the need for an integrated, comprehensive, resource management policy which takes all factors into account,
6. provide an opportunity for discourse and further learning regarding the social and cultural values and traditional land-use systems of the Rendille.

Approaches

Several techniques were used in an effort to determine which were more successful. They were:

1. short talks by prominent and respected members of the area,
2. interviews with local people, and with IPAL scientists and staff,
3. short stories and dramas (to depict environmental problems and possible solutions),

4. simple descriptions of ways and means used to study the environment.

At the end of each program, the presenter asked two or three questions on the content to emphasize the main points. After each question, a brief period of time was allowed to elapse (to encourage listeners to attempt to respond) then a short, concise answer was given.

Experimental Radio Sites

Nineteen Rendille 'manyattas,' within access of IPAL field stations, were selected as the sites for placing radios and carrying out evaluation of the individual programs. Cooperation of the chiefs and sub-chiefs was sought, and several acted as custodians for the radio sets. In addition, adult educators assisted IPAL field assistants to complete evaluation forms and to answer questions and lead discussion after each program.

Content

The first few programs included interviews with local people...herd owner, traditional leader, chief, headmaster...to show how different people interact with their environment, and to point out common problems regarding the use of resources. A few programs were concerned with how people obtain knowledge, and how studies may help find solutions to problems. There were also programs specifically concerned with topics of interest to nomads, such as water, trees, soil, camels, goats, rangelands, wildlife. climate, etc., for which the scientists provided input. The programs were recorded in the study area, with as much participation as possible from the nomads themselves. Much use was made of Rendille vocal music and of local sound effects (e.g., people and livestock at the wells, wildlife sounds, children playing).

Formative Evaluation

A short evaluation form was designed to be used by field assistants after each radio program. Data were collected on the quality of radio reception, reactions and comments of the listeners, and on the evaluator's own assessment. This ongoing evaluation helped to spot weaknesses and enabled continuous modification of the programs. A total of 480 evaluation forms were completed and analyzed.

The quality of radio reception was found to be variable, especially during the first part of the series, but generally was between fair and good over most of the study area. The average group clustered around each radio consisted of 16 adults and 10 children per program.

The reaction of listeners was good: 87 percent of the evaluation forms indicated that people listened carefully; 52 percent indicated some talking during the program and 35 percent marked some laughing; 66 percent of the forms indicated discussion after the program; 19 percent indicated that someone walked away. A study of the evaluator's comments on these reactions showed that the most common reason for laughing was in response to local sound effects, e.g., animal sounds, and at enjoyment of the traditional music. Talking during the program was due to lack of interest in a few cases, but usually it was to comment on something that was said in the program, and even more so when listeners recognized someone they knew taking part. The most commonly given reason for walking away was when a listener did not understand Rendille. 76 percent of the programs elicited favorable comments, expressing pleasure and interest in some way, 45 percent of the programs elicited factual comments regarding the content, 2 percent elicited unfavorable comments. The assistants' own comments were invaluable in helping improve the content and the production of the programs.

Summative Evaluation

Two surveys were conducted, one before the programs began, and the other at the end of the series to determine whether the objectives of the programs were achieved. These surveys were conducted with the aid of Rendille-speaking field assistants using a structured interview schedule. The sample of respondents was stratified to represent the various elements in the Rendille population (i.e., elders, women, morans [young warriors], and leaders, teachers, and pupils were present) in each of the 'manyattas' where an IPAL radio was placed. The interview schedule was designed to include a few questions related to each of the six objectives of the radio programs.

106 and 119 people were interviewed in the pre-radio programs and post-radio programs surveys, respectively. As far as possible, the same respondents were interviewed. However, when this was just not possible, a close match was made. To ensure that gains achieved were not due to educational differences in the two samples, a Test of Educational Profile (Steel and Torre, 1960, p. 366) was carried out. There was no significant difference at $p < 0.01$.

One of the objectives of the radio programs was to acquaint Rendille in the study area with the work of Unesco (IPAL), and to help establish favorable public relations. The first three questions in the interview schedule were designed to see whether this objective was achieved.

Question 1--Have you heard of Unesco?

	Yes	No	Totals
Before R.P.*	72	34	106
After R.P.	115	4	119
Totals	187	38	225

*R.P. = Radio Programs

A significant gain ($p < .01$) was made.

Question 2a--Do you know what Unesco is doing here?

	Yes	No	Totals
Before R.P.	34	72	106
After R.P.	112	7	119
Totals	146	79	225

A significant gain ($p < .01$) was made.

Question 2b--If yes. explain what you think Unesco is doing here.

There was a significant difference ($p < .01$) both in the percentage of respondents who were able to answer the question after the radio programs, and in the shift from describing an activity, e.g., "Unesco keeps herds" to an awareness of Unesco's role in study, research and advice.

Question 3a--Do you think Unesco is good or bad?

	Good	Bad + Neutral	Totals
Before R.P.	55	51	106
After R.P.	111	8	119
Totals	166	59	225

A significant gain was made ($p < .01$)

Question 3b--Why do you think Unesco is good or bad?

	Improves Environment	Provides Assistance	Study/Research Gives Advice	Totals
Before R.P.	8	28	16	52
After R.P.	17	43	59	119
Totals	25	71	75	171

The above followed a "Unesco is good" response. There was only one "Unesco is bad" response. There was no significant difference ($p = 0.05$). This indicated that the value people attach to the categories above did not change as a result of the programs. People in the study area still valued highly any direct assistance, e.g., employment, which the project can provide.

Objective 2 of the radio programs was to help create awareness of environmental problems, i.e., desertification, in northern Kenya. Questions 4-7 below were designed to measure any gains in this direction:

Question 4--What are some of the things you get from your surroundings which help keep you and your family alive?

Question 5--Do you think that too many trees are being cut?

Question 6--Do you think there are more or less plants here now than when your parents were children? Why do you think this is so?

Question 7--If herds eat all the plants in an area and leave the ground bare, does it hurt the land? If yes, how?

Appreciable, significant gains ($p < .01$) were made in 5, 6, and 7. Some interesting results in this area were:

1. There was some difficulty in understanding Question 4. An appreciable number of respondents stated that there were "no problems" obtaining basic resources. Failure of rains, or lack of water was the most often-cited problem (44 percent).

2. A large number of respondents (41 percent) in the pre-radio programs survey thought that not too many trees were being cut down, due to government's advice to plant more trees. The figure was reduced to 18 percent in the post-radio programs survey.

3. Surprisingly, many respondents (59 percent) in the first survey answered that they thought there were more plants now in their surroundings than when their parents were children The figure was reduced to 39 percent in the second survey.

4. In response to Question 7, about 10 percent of the respondents

answered that the land would lose its beauty or would not look nice if it was bare. This is noteworthy, considering that Maslow's hierarchy of needs places aesthetics way up in relation to basic needs.

Questions 9 through 12 were designed to assess achievement of Objective 4, which was to foster positive attitudes towards conservation of resources. The questions asked the respondent whether he or she was doing anything to protect or improve (a) the soil, (b) plants, (c) wildlife, and (d) water. Significant ($p < .01$) gains were made in each of these areas. The smallest gain, understandably so, was achieved in the protection of wildlife. Predators represent a big threat to the pastoralists' livestock and there is a stated desire to exterminate them. Consequently, whereas the sound effects of the wildlife program were enjoyed, the actual message of that program was one of the most poorly perceived.

Objective 6 was to use the production of the programs as an opportunity for discourse and further learning about the social and cultural values of the Rendille. Questions 13 through 19 sought information. Question 20 asked the respondent whether he or she would like to ask any questions. Some interesting findings in this area were:

1. The Rendille value large families; 50 percent of the respondents indicated over 10 children as being desirable.

2. They perceive the need for money by indicating that they would value some of their children getting a wage-earning job elsewhere to help out.

3. When asked what kind of work they would like their children to do, 42 percent answered "go to school," and 33.7 percent answered "some to look after the animals and some to go to school." Thus, they clearly indicated their feeling that school and keeping herds do not go together. This information has important implications, as it shows that the education or training required to modify livestock management practices is not going to be effective if channeled only through the schools, for it will not be reaching those who are actually going to be keeping herds.

4. Family ties are close; 49 percent of the respondents would like their children to live nearby.

5. The illiteracy rate is high; 77.8 percent of the respondents in both surveys had no schooling or only a few months of adult literacy classes. Noteworthy is the fact that the percentage who stated that they'd like more education shot up in the second survey.

Questions 21 through 24 sought information regarding the use and ownership of radio sets.

Of those interviewed before the radio programs, only 11 percent had radios, and 89 percent did not. After the radio programs, 24 percent claimed to have radios. Some stated that they had bought or had radios repaired so that they could listen to the programs. This demonstrated that it is possible that more people would buy radios if there were more programs in their vernacular language. (Presently there is only 1-1/4 hours of Rendille programming per week.)

In the pre-radio programs survey, 41 percent of the respondents said that they did not listen to the radio at all, 47 percent had listened sometimes and 12 percent listened every day. In the second survey, 74 percent listened sometimes (13 percent to the Unesco radio programs only), and 26 percent listened every day. This of course is largely due to the availability of the Unesco radios in the experimental sites.

Eighty-nine percent of the respondents stated that they generally liked the radio programs, 1 percent disliked them, 10 percent gave no opinion; 91 percent stated that they had learned new things or that they had found the programs educational.

It was not possible, with any real validity, to measure gains made towards the achievement of the other main objective, which was to sensitize decision makers in the area to the need for an integrated, comprehensive resource management policy. However, the large degree to which decision makers were involved in the production of the radio programs (e.g., acting as custodians of the radios, being interviewed for programs, participating in discussions, helping oversee program evaluations, etc.) appears to have had a very positive effect.

The test case was considered a success as real gains were measured in five of the six objectives. It has shown that this medium of communication, with some limitations and certain modifications, has a good potential for future environmental education endeavours in the study area, and possibly with other nomadic pastoralists living elsewhere in northeastern Africa and in the Sahelian zone.

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SINGLE INSTITUTION PROGRAMS

This section's case studies all deal with an individual program originated for a single institution, either a primary or secondary school, university, or education center. Being institutional, they deal primarily with formal education audiences. The nonschool institutions are the Melbourne Zoo and Lejre Center.

The concern in the zoo programs is with people's attitudes toward wildlife and conservation. The zoo, offered as a resource for classes, places a priority on integrating with the classroom curriculum, whether a pottery class. dental students or six-year-olds. Stewart Jackel goes on to describe a zoo which is set up for maximum contact between humans and animals in near natural conditions.

The Lejre Approach, described in the other center case study, is an experiential, activity-oriented approach to education which brings museum subjects alive. Margaret Tracey West and Hans-Ole Hansen depict the use of imitative experiments and ethnological workshops whose firsthand experiences focus on ethnology and are similar to living history programs in the United States. This study from Denmark includes a summary of interpretation efforts for mass audiences as well.

The two school programs are community focused in scope, using the community as the learning resource. Don Richards' case study on an environmental study program in an African primary school is an example of thematic education, using the Mooi River watershed as its theme. Classes spend three to four investigation days camped at study areas along the river and then consolidate their findings back in the classroom. The students explore towns, cities, cultural and natural sites along the river and involve all disciplines in their studies.

The German secondary school study of mining investigates the local industry and the environment it consumes. Developed by university education students, the course outline provided is quite specific, listing theme, goal, objective and teaching strategy of each unit of the course. The curriculum is designed not to condemn mining, but to show students planning strategies and also the irreparable change to the environment that ensues from mining and therefore from their own energy consumption. A trip to the site prompted field inquiries and critical questioning.

Ian Robottom's case study also deals with a university course for teachers. The Australian course concerns both curriculum development and personal development of the teacher's problem-solving skills, knowledge, values and attitudes as environmentalists. The course, sensitive to the individual nature of teaching situations, shys away from a prescription of universal objectives and from requiring specific environmental subject matter. Instead, the teachers negotiate end goals. The issue-based approach, integrates disciplines and deals with subjective factors such as emotions and politics. The teaching team uses and promotes nondirective, inquiry teaching.

The other university courses presented are examples of environmental studies courses which put the basic principles of environmental teaching into practice. All three university programs are strongly interdisciplinary and integrative. The Environmental Studies Program (ESP) described by Lars Emmelin and Susanne Soderlund in Sweden circumvented the barrier of discipline entrenchment logistically by being placed outside the normal administrative structure, directly under the university chancellor's office, with its own budget. The ESP offers courses to members of the university community, the Institute of Technology, and inservices for working professionals, cooperates with the National Farmers' Union and Swedish government departments, and on an international level in conferences and research.

The Thai experience outlined by Nart Tuntawiroon melds economics, politics, ecology and other disciplines to train resource and environmental planners and managers as integrationists with a holistic view of resources and environmental systems. Integrationists are distinguished from specialists by their holistic view and from generalists by a specialty in one area of knowledge. The case study highlights the grass-roots origin of environmental education in the university, student participation in the revolution, and the learn-by-doing features of the university program.

The last study of the book details Frederico Pannier and Orlando Ruiz's conviction that the major obstacle to a person's active involvement with environmental problems is his or her inability to describe the phenomenon. To conquer this barrier they have created a descriptive matrix for environmental problems. The matrix moves their Venezuelan students through the problem-solving process from observation to alternative solutions to suggesting action.

This final set of case studies is as diverse as the institutions that created them. Examples of holistic approaches to environmental education, most deal intentionally with the total environment and human interaction with it in an interdisciplinary manner. Spanning five continents, they present a fitting finale to this book, providing insights into environmental education theory and approaches around the world and program models applicable to a variety of settings.

GARDEN SETTINGS FOR ENVIRONMENTAL EDUCATION: CASE STUDY TWO, ROYAL MELBOURNE ZOO EDUCATION CENTER, AUSTRALIA

Introduced by Dr. Peter J. Fensham,*
Case Study by Stewart G. Jackel**

INTRODUCTION

Large cities are often able to establish and sustain zoological gardens. The zoo in Melbourne has undergone an amazing transformation in 13 years. At the centre of its transformed character has been its Education Service. With nearly 3 million people and more than 1,000 schools not more than an hour's drive away, the opportunity is obvious. Something of the way this chance for environmental education has been grasped is told by Stewart Jackel in his report. Many other programmes in Australia have good stories to tell and the recently formed Australian Association for Environmental Education is conscious of how many fields it has not penetrated.

CASE STUDY

As pieces of jargon, the terms "environmental education," "values education," and "curriculum extension" are comparatively new. The idea that children can be expected to be educated outside a classroom is also relatively new. While the assertion that "excursions interrupt the proper functioning of the school" is now rarely heard in Australian schools, there is still a significant number of teachers who do not apply the same sort of educational planning to out-of-school experiences as they do to in-school activity.

The Education Service at Melbourne Zoo was set up in 1969 and staffed by a teacher half-time. By the time of writing (1982) the Service has grown to 14 full-time teaching and 5 ancillary staff. It is a cooperative venture between the Zoological Board of Victoria, which controls the Melbourne Zoo and supplies ancillary staff and finance, the Education Department of Victoria, which supplies 13 staff, and the Catholic Education Office, from which two teachers are seconded. It operates out of a large resource centre and eight "classrooms" equipped with a range of live animals, prepared animal specimens and electronic media as teaching aids. In 1982 about 100,000 students were taught by service staff. The Service grew to this substantial size when the ideas mentioned above were just becoming respectable.

These are two pre-eminent reasons that explain the growth of this large and expensive system: the methodology employed has received wide and enthusiastic approval; the philosophy is firmly based within environmental education.

Let's begin with the methodology; this is the thing that interests teachers most.

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The Service has evolved a system of face-to-face teaching in a single class or working-group basis. Adopting the premise that all the activities of a school should grow out of the school curriculum, the Service argues that any class excursion should be seen as the best way, all things considered, to achieve the objectives the class is currently working towards achieving. The class work program will show lead-up activities as well as post-excursion work. There will be a clear set of objectives which the excursion is designed to achieve (they may be academic or social or a mixture of both) and these objectives will differ from group to group. Therefore, each class visiting the zoo should expect a set of activities specifically designed to meet its own needs.

Melbourne Zoo's Education Section has sufficient staff to do this. In 1981 about 5,000 separate groups ranging in size from 3 to 35 were taught. The only thing they had in common was that they wanted to work on animals. A class group of 25 six-year-olds might want to explore the concept: "animal." They need to use as many senses as are appropriate (including touch). Twenty 12-year-olds might be intent on some creative writing. Here, the level of their writing skills will need to be taken into account. Some 14-year-old pottery students, having mastered clay-working skills, might be ready to attack the problem of how to sculpt a giraffe or a snake. The animal ethology option group from the senior biology class may want to investigate their own projects. The dental faculty of the university may want their anatomy students to look at comparative dentition and feeding methods. Each group will be presented with a selection of activities which may include a session in one of the zoo-rooms, some data collection by notes on a card, a camera, a sketch pad or perhaps best of all, memory. The group's teacher will be presented with ideas and teaching aids to help in integrating the excursion into the "normal" routine.

It is critical that most of the time be spent in the zoo grounds. But it is also important that the students approach the zoo in a controlled fashion; too many stimuli at once will not be productive. They should also gain close, preferably hands-on contact with appropriate live animals or specimens. It is clear that concepts about animals are most efficiently learned by such "real" experiences.

Melbourne Zoo aims to increase contact between animals and the public to a maximum within reason. A significant amount of stock, mainly birds, roams free in the gardens. Enclosures are designed to reduce barriers as much as possible. Dry moats with low safety fences allow people to see, smell, and hear animals at close quarters. Glass and wire mesh restraints are used only when most appropriate. The zoo also has three large enclosures where the humans are restrained among the animals. Two park areas have been designed to allow macropods and some larger birds to range over several acres while the public are confined to pathways. The third and most exciting of this new breed of enclosure houses over 50 species of Australian birds in a 100-metre walk-through aviary where people can wander through rainforest, across a swamp and through scrubland. The humans are confined to an elevated walkway but the birds move freely often inches away from the observers. The vastly increased contact where animals can be experienced in near-natural conditions has caused enormous changes in the attitudes of people to animals in general and the zoo in particular.

However, members of the public cannot touch more than one or two species. Class groups using the Education Service will nearly always have hand-tamed animals and prepared specimens made available to them for contact. The amount of contact and the animals used will reflect the objectives of the group. Complete animals skins, as well as a large range of skeletal material is available. The service's animal keeper maintains stocks of the usual barnyard animals for contact as well as "wild" stock of possums, wombats, an echidna, a cockatoo, a tawny frogmouth, stumpy-tailed and blue-tongue lizards, bearded dragons, carpet pythons, corn snakes, boa constrictors and tortoises.

The live animals are primarily a magnificent teaching aid and can be used in a thousand different ways with all levels of students. Most importantly though, the animals are available for children to touch, to hold, to become involved with, to identify with, to begin to feel, to understand.

The Service has a large and increasing clientele among handicapped students. The handicapped teaching team is led by a trained specialist and the methods they employ are the same as those applied to "normal" groups. Domestic animals are useful for contact, particularly with children suffering poor psychomotor coordination, and groups must be small to allow properly supervised contact.

The philosophy under which the Service operates extends beyond that appropriate to science teaching. It is expected that people will leave the zoo having acquired a knowledge base upon which more positive attitudes may be built. The zoo, representing part of the natural environment, functions in education about the environment. While there are deficiencies in this information, principally in nature and extent, concepts are very efficiently learned in a zoo.

Further, the education takes place in a representation of the environment. Melbourne Zoo's enclosures are built and planted to represent the environment from which the animal is derived. As well, imaginative planting of Australian native plants around the Australian Section enhances an awareness of and a feeling of being in a natural environment.

So we are talking about an awareness base for informed decision-making, not just information about animals. We are talking about attitudes formed in the light of an understanding of an animal's structure, behaviour and habitat developed from a set of experiences with the "real" object.

The emotional responses humans have towards animals are also of critical importance. The initial emotional responses are a powerful stimulation to learn. They also lie at the basis of the re-thinking and formation of positive attitudes to wildlife in general and conservation in particular.

THE LEJRE APPROACH TO ENVIRONMENTAL AWARENESS

by Margaret Tracy West and Hans Ole-Hansen (Denmark)*

Throughout history man has changed his natural environment and been changed by it. He has had to devise new ways to adapt to a changing environment and he is now having to do so faster than ever before.

To understand how man has adapted in the past, we must observe how people lived in other times and places. Knowledge of man's life processes, his traditions and technologies, in the past can tell people today about man's relationships with his material culture and the environment.

Certain disciplines are pertinent to this subject; for example, anthropology, the science that deals with the social, physical and cultural development of mankind, and cultural ecology which deals with the environmental energy accessible to man and the effect of its use on society.

In our accelerated world of technology the gap between specialists and the public is widening. The ultimate responsibility of specialists is to communicate to the public the options now and in the future and to offer guidance toward the wisest alternatives.

It is the calling of educational institutions such as museums and cultural centers to communicate specialized knowledge to the public. Both museums and cultural centers may be defined as permanent, public, educational institutions. However, museums care for their collections systematically and cultural centers are designed primarily around educational activities.

The Historical-Archaeological Research Center of Lejre, Denmark has a new approach to bridging the gap between specialists and the public. It bases its educational activities on imitative experiments in archaeology.

Imitative experiments are controlled experiments in which the natural conditions and life processes of past cultures are simulated as far as possible. Past technologies are used to replicate artifacts from a given material culture. In this way not only the artifacts are replicated, but the technologies thought to have created those artifacts originally are also recovered. The replicated artifacts are then used as they are thought to have been designed, according to previous research.

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Often the original artifacts tell the public very little about life processes and natural conditions from their closed display cases. However, when copies of the original artifacts are used in their appropriate context they speak a common language that all can understand. They speak to us of a functioning society in another time and place or perhaps in our own time but in another place.

The Lejre Center's approach can help museums bring their collections to life for the public and schools bring their subjects alive for students. How did the original artifacts function and what was their role in man's existence? Original artifacts must be preserved for future generations. They are irreplacable witnesses to another society. However, we believe and have proven that replicas fashioned and used as we think they were in the past can tell people today about the past, the present and perhaps something of the future.

The Lejre Center's approach is built of three integrated stages: imitative experiments, educational activities, and environmental interpretation.

The approach aims to draw people to a closer understanding of the interdependence between man, material culture and the environment. It is a new approach to museology and education. Aspects of the approach have been tried in other parts of the world, but to the best of our knowledge, the Lejre Center is the only institution to integrate all three stages. Through all stages run the themes of coherence (natural, logical and consistent connections), function (the activity or purpose for which something is designed) and participation (partaking or sharing in). Through participation we aim to understand a functioning, coherent society from another time and/or place and to gain insight into the present and future.

IMITATIVE EXPERIMENTS

Imitative experiments focus on specific objects and the materials and conditions that affect those objects. Imitative experiments are used in order to transform beliefs about the past into inferences. The inferences are controlled by anthropological research and related to specific times and places. Such experiments can be conducted in scientific laboratories or in field research stations. However, when imitative experiments are done in field research stations both the environmental and human conditions which affect each link in the process are included in the study.

Imitative experiments require participation by people trained in the fields of anthropology, in workmanship and crafts, and people skilled in leading imitative experiments. Imitative experiments combine the resources of people trained and experienced in both academic and practical work. For example, a single experiment conducted at Lejre in 1974 on the prehistoric "rangle," a musical instrument used in connection with horse-drawn carts, involved two Swedish archaeologists, one Norwegian engineer, one Danish carpenter and one Danish farmer, the research leader and the photographer of the Lejre Center.

EDUCATIONAL ACTIVITIES

Imitative experiments form the foundation for educational activities. When the function of artifacts is rediscovered through imitative experiments, the material culture can be used as a frame for educational activities. Students participate in planned educational activities in ethnological workshops in an effort to "learn through doing" what men in other times and places have known. The workshops are termed "ethnological" because ethnology is the branch of anthropology that analyzes cultures with regard to historical development.

There are no geographic or time period limits set when choosing societies and their life processes for study. The magnitude of change over time can be seen in both prehistoric societies and societies in present-day developing nations. People living in the developing nations today are experiencing a lag between their culture and their technologies. Developing countries could be included in workshop situations in pilot projects for developing appropriate intermediate technologies--that is, technologies that are suited to the given environment on a village or labor-intensive level.

There are two aspects to the educational activities in the ethnological workshops: objective and subjective. In the ethnological workshops students learn that with a given capital of technology, raw materials from natural resources can be transformed into useful materials for man's use. Each link is experienced in coherence with the former and following link when transforming the raw materials. Seldom today does man find himself involved in all the transformation links in the industrialized world. In the ethnological workshop students can experience the links between standing trees, cutting timber, splitting and transporting it, fashioning and building structures in chosen places and seasons. They learn of the effects of time by seeing the results of wear and destruction on those structures.

There is also the subjective part of the education which is immeasurable. Students come to place new values on the final products based on the investments of time, labor and resources. They see the coherence between raw materials and final products and consider the eventual end of those products, measuring their value to man's existence.

The educational activities should always be based on specific imitative experiments which aim to reach situations comparable to what anthropologists think is a realistic approximation of past situations. In these workshops modern man is placed as a participator in a period and a culture other than his own. Participants come from differing backgrounds and ages. This creates a socio-psychological atmosphere conducive to stimulating reflections on cultural relationships with the natural environment. American students comment on their participation in educational activities in the ethnological workshops of the Iron Age Village at Lejre:

> This class represents an unusually high level of involvement with primary source material. I know that we are taking home a widened view of ourselves and our relationship to our environment. Maybe we are taking home more questions than answers.
>
> This is a truly revolutionary concept of teaching. Participation in 'Iron Age existence' gave me insights into areas of thought I have never explored before.

Understanding a coherent community through actual participation is based on firsthand experience which can arouse man's awareness of his interaction with and mutual dependence on the environment. The educational programs at the Lejre Center contain three phases: preparation, experience, evaluation. We have found that when an educational experience is limited in time and space it must be expanded into what cannot be seen or tried. The experiential training is augmented by study tours to museums and open-air museums, the use of educational texts and interpretive media.

ENVIRONMENTAL INTERPRETATION

The firsthand experience offered in the educational activities of the ethnological workshops is not available to the thousands of visitors that crowd to cultural centers such as the Lejre Center every season. This is true in part because of the brevity of the visitors' free time and in part because of the burden it places on the center's capacity. Out of the initial need to supply background information to visitors, the Lejre Center developed the third stage of its approach: environmental interpretation.

Information, as such, is not interpretation. Interpretation is revelation based upon information. Interpretation seeks to provoke rather than instruct (Tilden, 1957). There are two types of interpretation: human (talks, cultural demonstration and participation) and nonpersonal (audio-visual media, exhibitions and signs).

Neither type of interpretation can replace the other. The most effective interpretation depends on the combination of both human and nonpersonal media. Nonpersonal media alone can never reveal what firsthand experience can reveal, but it can extend the experience by showing the visitor situations not readily visible. Interpretation seeks to relate what can be seen or perhaps tried by the visitor to something within his own personal experience. An interpretive system combining the human and nonpersonal media can reveal the coherence between what is readily seen or experienced and the meanings and relationships behind the experiences.

Let us briefly explore the uses of interpretation and some of the possible combinations of human and nonpersonal interpretation. Nonpersonal media such as exhibits and color slide shows can be used to orient the visitor and motivate him to explore the possibilities of his visit. He will be better prepared to use the human part of interpretation more efficiently. He will be prepared to ask questions of a deeper nature, thus obtaining more from cultural demonstration and talks. He will also be motivated to look around him in the landscapes and milieus for meanings and relationships that he might easily miss without a few interpretive hints.

A system of interpretive media can also be used to widen the perspective of the visitor. For example, seasons, religious and social conditions, stages of development not experienced by the visitor can be presented.

A visitor may try to use an Iron Age sickle or perhaps watch a friend try. He may then feel he fully understands what it is to harvest with a sickle in the Iron Age. A few minutes of such activity can be quite enlightening and challenging. Yet, he has perhaps learned only something of the technological part of life processes in the past and not of traditions and conditions. When he later sees a color slide show or reads some text on the circumstances under which that sickle was used and the duration of time with which that sickle had to be used to support Iron Age life, his perspective will widen.

Color slide shows or text alone can be rather meaningless without a bit of firsthand experience and the experience without a fuller understanding of its background expressed through media may be incomplete. Not only must there be a coherence between what can be seen or tried and what lies outside that realm, but also there must be a coherence in the interpretive system--a logical connection between human and nonpersonal interpretation.

The widespread prevalence of preserved houses and structures and reconstructions around the world in open-air museums and centers reflects the impact of environment and geography on material culture. These buildings are mainly monuments to the past and cannot or are not intended to be used. In such situations interpretive media must carry the full responsibility of communicating to the public, as there is no chance for firsthand experience with the material culture.

The advantage of the Lejre approach is obvious when one considers the gap between firsthand experience with the natural environment and the coherence between natural resources and the end products of those resources which constitute material culture and the sophisticated descriptions of such by the media.

Many people in the industrialized world today cannot relate such descriptions to anything in their own experience. And on the other hand, people living in still coherent societies as in the developing countries are often untrained in reading texts and using sophisticated media. The Lejre approach can be used by people in both situations.

We strongly believe in the value of the Lejre approach. It must, however, be continually strengthened by ongoing research and pilot projects. Our staff members must renew their knowledge to better the coherence, participation and function of our work. Contact with museums, educational institutions and interpretive centers is essential if we are to maintain the high standard which keeps centers such as ours useful to those institutions. The Lejre approach is an extension service to museums, schools and research projects.

Financial support is needed to improve the three stages of the Lejre approach: research, education and interpretation. To strengthen our contacts and promote pilot projects we have decided to gather information and edit a world handbook on examples of projects related to the Lejre Center's work.

Examples will be taken from both past and current projects and will elucidate the Lejre approach. We have also decided to offer consultance and courses and to participate in launching pilot projects in Denmark and abroad. We feel that the Lejre approach gathers importance on both the national and international level as we face the 21st century.

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ENVIRONMENTAL STUDIES ACROSS THE SCHOOL CURRICULUM: A CASE STUDY OF TREVERTON PREPARATORY SCHOOL'S ENVIRONMENTAL STUDY PROGRAMME

by Don Richards (Republic of South Africa)*

INTRODUCTION

Every "standard five" pupil at Treverton automatically spends a year completing the environmental studies year.

During the year, the students cover the normal Natal Education Department academic curriculum, but in an environmental manner. This is to say that the normal subjects, i.e., science, geography, history, mathematics, Afrikaans, English, art, religious instruction, physical training, are taught outside of the classroom in the outdoor environment and that consolidation is done back in the classroom.

The key to the success of such a venture into a new style of education is to have a central theme to work on. We here at Treverton have chosen the Mooi River as it flows close to the school and is of vital importance to the interactions that take place between all the various communities in the district.

A study is made of the river from its source at Highmoor in the Giants Castle Game Reserve to the Mooi River Falls. This is a distance of some 150 kilometres in length. Study areas along this stretch are selected and the class spends three or four days camped at such a study area, using the environment there to cover all the subjects normally taught in a classroom.

As the student undergoes the experience of noting his findings and putting them down on paper, consolidation back at school on his return is amplified by the use of his textbooks. The subject is now alive and understood by the student as he has actually been there monitoring, assessing, noting his findings and now fully understands his textbook or lessons in the classroom.

PROCEDURE

Field studies normally take place from Tuesday to Thursday. We set out from school after the first period on Tuesday morning and return to school at approximately 4:00 p.m. on Thursday afternoon. Mondays and Fridays are run as a normal classroom situation at school where the class is taught by other subject teachers as well. The week following the field study is used to put together and consolidate what has been learned and written in the field; normal teaching periods are carried out during the weeks back at school.

The environmental classes at Treverton have 25 pupils in each class. A class is divided into five groups. With each study project, although

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the class studies the whole, each group concentrates on a particular aspect of the whole.

Study Areas

As we are using the Mooi River as the central theme, we cannot divorce it from the rest of Natal. The history, geography and ecology of the whole province has affected the Mooi River area and vice versa. Whilst covering these subjects, in situ, it is logical to cover practical mathematics, language, art, and physical education in these areas. Physical education is covered by hiking, climbing and canoeing during research periods.

The study areas covered are:

1. The school and its environment.
2. The Giants Castle Game Reserve--study of the Bushmen.
3. Mooi River Town--an urban study.
4. Fernwood--study of the source of the Mooi River and its environment.
5. Zululand--study of the culture and history of the Zulu people, plus beshveld ecology and estuarine ecology.
6. Rosetta--study of the upper-middle Mooi River and its environs.
7. A study of Durban--early history of Natal, early settlers, plus study of fish, reptiles, ducks.
8. A study of Pietermaritzburg--capital of Natal.
9. Study of the Mooi River Falls area.
10. Comparison of all study areas and conclusions.

For the sake of this case study I will cover just two study areas. The methods employed for all areas is similar.

A. The School and Its Environment

STUDY 1 A STUDY OF TREVERTON SCHOOL

Aim of Study:

1. To extend pupils' knowledge of their immediate surroundings.
2. To make the pupils aware of the interrelationships that exist in their immediate surroundings.
3. To show the pupils that learning of all subjects across the curriculum can be achieved successfully outside of the classroom.

Outline field work

Preliminary Reconnaisance - Survey of area

Prepare Environmental Room - Display boards, tables, tanks, special equipment.

Collect reference material - History of Mooi River area from town clerk; map of Mooi River from town and regional planning; books on local soil and flora.

Work materials - Prepare and duplicate worksheets

Organize field work - Clipboards, metre rule, 30 m. tape measure, binoculars, tape recorder and tapes, camera and slides, bottles for samples.

Introduction of Study

Division into groups; allocation of group assignments.

Group 1	measurement of buildings; survey of food used in school
Group 2	measurement of playing fields, etc.; study of swimming pool filtration system
Group 3	map of area--compass work; photographic record-record weather; litter patrol and survey
Group 4	survey of soil, collection and pressing of flora; plant keys; survey of school maintenance costs
Group 5	survey of fauna; tape recording of groups at work; interview headmaster re: history of school; interview older residents in town re: school history.

Fieldwork

Three days--each group works on its own assignments.

Work in School

Consolidation

Conclusion of Study

Groups 1 and 2	Preparation of exhibition, model of the school to be the central theme Written information of measurements and architecture Talk accompanied by slides, maps, model, given to the rest of the class and to the other standard five class.
Group 3	Permanent weather station set up Display produced including a detailed map of the area, litter points displayed on map Present a slide show together with Group 5 Audio visual production given to other standard fives. A litter tree plus display of animal and human litter presented A litter questionnaire
Group 4	Charts, drawings and models to accompany exhibition, these to include soil profile and erosion models Complete herbarium Talk to other standard fives
Group 5	Charts and drawings to accompany exhibition Fauna tank (live specimens) to be central theme Bird sounds Talk to other standard fives

Evaluation and Recording of Students' Work and Progress

Record work done by each student. Progress in writing, language, math and other skills noted. Note special talents. Pupils involved in a narrow band on the project noted, so that they can be involved in other areas.

Collect and store all material for exhibitions (e.g., Parents' Day) or for reference.

B. An Urban Survey

A study of Mooi River Town. The class in the first week of the urban survey visit the textile factory, the cheese factory and the municipal buildings.

These visits are early during the day and once the visit is completed, the class breaks up into its five groups to work on various surveys in the town.

Group 1 - Complete a geographical study of Mooi River: This includes a study of land use and future town planning. The group, armed with clipboards, paper and writing materials, records all the buildings on Mooi River and their use. Using a key, these would be filled into the map provided. The group also interviews the town clerk and discuss future town planning. They also draw different styles of architecture.

Group 2 - Complete a pollution and health survey: Aided with camera, tape recorder, paper and clipboard and a map of the area, they photograph and plot on the map all signs of bad pollution and litter in the town area. They also note the state of the drains, of the river, streets, pavements, gardens and the shopping and industrial areas.

They record noise pollution and take special note of industrial waste. They collect water samples at various points along the river for analysis. They also interview the town engineer, study the disposal of rubbish and sewerage, and study the town water supply.

Group 3 - Complete a food survey: They visit all the shops that sell food and trace the origin of all food sources. Using a form provided, they list what kind of food it is, its make and place of origin.

They work out which are the most popular goods. Visiting the local dairy and stockyards, they assess where the local milk, butter and cream come from and where it is going.

Group 4 - Complete a communication survey: This includes a study of the post office system, the telephone exchange, the railways, garages and a vehicle census.

Group 5 - Complete a people survey: This would include checking on past records from municipal offices and churches. Population counts between 1900 and the present; marriages, births and deaths. The team also goes from door to door inquiring on the number of men, women and children in each home and places of work. They record family names, dates of birth and death, and Christian names to establish the most popular name in the district.

During the second week each group works in a situation which dovetails in as closely as possible with the surveys the groups were involved in during the first week. Thus Group 1 works at the cane factory making cane furniture. Group 2 works with the town engineer, working in the laboratory making tests on the sewerage and the water supply. Group 3 works at Knowles Supermarket helping to pack the shelves, price articles, stock take, man the tills and learn all about a supermarket operation from the manager. Group 4 works at the post office where they get involved in the telephone exchange, the telegraph office and behind the counter. Group 5 works at the cheese factory and actually makes cheese through all the processes.

Each group, at the end of the two weeks, is given consolidation tasks to complete back at school. Here is the consolidation of Group 3, the group that worked at Knowles Supermarket:

1. Draw a rough sketch map of Mooi River and mark in the shops that sell food.

2. Draw a graph showing the imported food in relation to their countries of origin.

3. Draw a graph showing the food products in relation to their towns of origin.

4. Draw a pie graph showing the percentage of products manufactured by each compar"·

5. Draw a map of the world and fill in flow lines showing where the food products have come from. Research any food product you studied and write a small project on it; e.g., the fishing industry.

6. Draw a map of South Africa showing flow lines where foodstuffs sold in Mooi River have come from, and those produced in Mooi River go to.

7. Write a report in both languages (English and Afrikaan) on how cheese is made. Include drawings.

8. Draw a food chain showing the flow of energy coming into and out from the Mooi River stockyards.

9. Prepare a talk using slides and overhead transparencies on your survey of food imported to and exported from Mooi River.

Each group presents a teachback to the rest of the class and each individual writes a project in his/her book which is collected and marked by the teacher. The teachbacks are assessed for oral diction and art. These teachbacks are a fine way of instilling confidence in the child.

CONCLUSION

The effects of the Environmental Study Programme on the children have been quite noticeable. Altogether, the programme is still too young to reach definite conclusions. It is very noticeable that the students enjoy school during the year and that they become self-reliant, confident and self-disciplined and full of initiative. They take pride in their work and are not averse to completing extra work without being asked.

Furthermore, this form of education immerses the students, physically and spiritually, in their surroundings, enabling them to gain a deep understanding of man's dependence on his environment and his responsibility to it.

ENERGY AND ENVIRONMENT: THE RHENISH LIGNITE MINING--EXPERIENCES WITH A FIELD STUDY INTEGRATING TEACHING COURSE

by Lothar Geerling* and Dr. Reinhold E. Lob**
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DIDACTIC ANALYSIS OF THE SUBJECT

In the course of the worldwide discussions about environmental topics concerning the Unesco programme "Environmental Education," several international and national conferences generally agreed not to establish a particular mode of teaching of the environment. It was clearly stated that environmental education has to be realized as a principle of teaching in various traditional subjects. Due to the fact, however, that most of the environmental problems are related to biology and/or geography, these two subjects were regarded as the foci of environmental education.

For years geographers dealing with writing schoolbooks and those engaged in teaching have been publishing a variety of proposals concerning environmental studies in schools. Most of all, it was by the German Unesco Conference in Munich that special proposals were directed to the ministries of education supporting more environmental topics in the curricula issued by the regional administrations of the Federal Republic of Germany. But because these curricula have just been changed, new alterations can hardly be expected in the near future. Environmental education must therefore be realized within the framework of the existing curricula.

To proceed in that way, however, seems to be effective because there is a variety of topics that allow an education of a better awareness of environmental problems; to outline the given possibilities the following course is presented. The Rhenish Lignite mining has been a traditional part of the curriculum for Form 7 of Northrine-Westfalia's secondary schools illustrating the ways by which man-made damages to the environment can be overcome.

During the past, this topic was generally focused on the ways of mine-working as well as on the methods and stages of recultivation. Neither the problems caused by the complete stripping of an old landscape nor the social effects of removing people or even the lowering of the groundwater table and the consequences for the adjacent areas near to the deep open-casts have been put into a close consideration. The admittedly impressive technical achievements, manifested by huge diggers, were generally so fascinating that a positivistic approach prevailed excluding all the other problems involved.

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It was only by the protests of numerous local initiatives against the gigantic mining projects HAMBACH I and II that the broad public became aware of the wide impact on the environment caused by this kind of mining. It also became known that archaeologists are confronted with nearly insoluble problems in this area that has been settled densely since Roman times. Moreover, the local population became interested in the history of their villages.

Because of this, the traditional topic "Lignite Mining" was enriched by a multitude of new aspects that have to be regarded as being parts of environmental education. It becomes clear that the conflicting antinomy between the energy demand of the industrial society and the changing of a traditional landscape into an "artificial" one embodies nearly insoluble perspectives corresponding to those that can be seen, to a smaller degree, with the planning of industrial sites, the constructing of new highways, the planning of garbage pits, the town planning and even with the planning of tourist areas. All these planning objectives seem to be inevitably necessary, but they are at the same time responsible for massive environmental problems. To explain these conflicts to scholars and students is absolutely necessary, but not by favouring the strategic objectives of only one side or the other.

So the main purpose of the following course is not to condemn Rhenish lignite mining, but to make obvious to the students that their daily and often unnecessary energy consumption promotes a development that will consequently destroy landscapes. Thus a personal involvement needed for bringing about an awareness of environmental problems and behavioral attitudes toward the protection of the environment must be evoked.

Ensuing from the students' personal involvements, an understanding of the increasing energy consumption of the industrial society and the resulting environmental stress can be achieved that goes far beyond the paradigm presented, i.e., to the hazards connected to the transportation of oil by tankers, to the submarine oil exploitation in the shelf region, or in rather unsettled areas of Alaska. To change deep mountain creeks by damming up into power sources destroys the relicts of natural landscapes in the same way as the vast lignite mining which is threatening the Rhenish landscapes with their historical traditions. Moreover, constructing nuclear power stations embodies particular problems.

THE RHENISH LIGNITE MINING

With an estimated scale of 55 billion metric tons, the largest lignite deposits of West Germany and of Europe lie within the triangle formed by the cities of Aachen, Cologne and Dusseldorf, holding a share of 87 percent of the national lignite production. Minor lignite deposits are situated in Lower Saxony, Hesse and Bavaria. The seams show a disturbed stratification due to the extensive block faulting of the early quarternary period. The seams close to the surface of the uplifted "Ville block" have been used by early mining.

Accordingly, this area of about 40 km by 4 km has already been largely recultivated in its southern parts. Up to now there are still existing the open-cast fields of Ville, Frechen, Fortuna-Garsdorf and Frimmersdorf. At the Erft fault the seams are partly pressed down to 600 m. In the past they have not been suitable for open-cast mining. Affected by numerous disturbances the seams turn up again to the West so that they show so profitable a stratification in the area around the town of Eschweiler that open-cast mining is possible again. The number of seams varies remarkably, differing from 20 to 105 m. in thickness.

The main purpose of lignite mining is the production of electric power, so that 85 percent of the production offers the exclusive fuel for the power stations situated nearby, providing 26 percent of the national consumption of current; thus lignite mining is an essential basis of the German power supply system. Only about 14 percent of the production is delivered to a briquetting plant that provides 5 million households with domestic fuel. Another 1 percent is used by the chemical industry, a share that may increase remarkably in the future. The use of lignite and its changes are shown in Table 1.

Table 1: The use of lignite in the Federal Republic of Germany 1960-1980

	1960	1970	1975	1980
National consumption in million metric tons coal equivalent	31.1	32.3	35	40
Thereof by				
power stations	13.5	23.5	32	37
industries	5.5	1.3	--	--
households and other smaller consumers	11.6	7.4	3	3

Source: ESSO A.G., Hamburg, Presse- u. Informationsabteilung.

With an oil supply becoming more and more uncertain, this outline shows that lignite mining is of high economic importance to the energy of the Federal Republic of Germany. Therefore, continuous open-cast mining cannot be renounced. Large open-cast fields are to be developed in an area between Grevenbroich and Erkelenz, adjacent to the fields near Eschweiler, and particularly east of the Hambach-Niederzier-Oberzier line.

In the Hambach area that is planned to be extended into the area of Bergheim, 51 villages with about 21,000 inhabitants have been resettled; if extended to 88 kms, another 10,000 people will have to move by 1990.

Thus the current and projected mining in the Rhenish District may be regarded as the most extensive and most radical change of middle Europe's environment.

The projected Hambach open-cast mining affects the gravelly and sandy strata of the main terrace of the Rhine with its loessial covers that are from 0.1 m. to about 4 m. in thickness. The cultivation of sugar beets and grain characterizes this agrarian landscape in its major parts. With the proceeding of mining in stages, 356 farm units in 21 villages will be affected; 82 of them are situated completely in the area of the planned open-cast fields. Other farm units will lose 2,366 hectares. Notwithstanding recultivation and resettlement projects, in this way hundreds of farm units will be abolished forever.

The lignite mining affects not only cultivated areas but also a natural oak--hornbeam-lime-tree forest, the "Hambacher Forest," with large stocks of old oaks. As a natural ecosystem this forest shows a varied range of species including particularly rare species.

Supported by the discussion about the protection of the natural and built environments the planning objectives that are to destroy this forest as well as the cultivated areas with its traditional farms and villages are more decisively criticized than could have been expected some years ago. Even if the achievements of recultivation and resettlement have to be recognized, the local population that has gathered in some initiatives shows, for personal and environmental reasons, very reserved attitudes towards these planning objectives. These attitudes have to be taken in consideration by a modern geograpy oriented to environmental education.

THE GENESIS OF THE TEACHING COURSE

The teaching course presented below is based on an academic course conducted by the authors at the Department of Geography, University of Essen FRG, considering both the didactic aspects and the public impact of the topics involved.

The number of students grouped in this course was so small that there was time for each of them to hold a lesson with students in school. After having prepared the scientific framework the didactic aspects were analyzed, the main and partial objectives were scheduled, the methods to be applied were defined, and a first outline of the course was sketched. All three sections of the course were tested before they were applied in school by the students, and the field study was added. Each section was discussed afterwards and necessary changes were made.

DIDACTIC OBJECTIVES, SECTIONS AND PHASES OF THE TEACHING COURSE

In this paper only a rough outline of the course can be given; a more detailed version may be obtained from Zentralstelle fur Umwelterziehung/Centre for Environmental Education, University of Essen, FB 9, 4300 Essen 1, Federal Republic of Germany.

First Section

Theme: Energy as the basis of man's existence

Main objective: The students should know the various kinds of energy and should acknowledge their importance to man's existence.

Partial objectives

The students should recognize: what energy is, the consumers of energy, the development of energy consumption and the energy production available, the kinds of energy, the differences between primary energy, secondary energy and energy available, the increasing energy demand, critical attitudes towards energy consumption, the degrees of energy consumption in industrial, socialistic and developing countries.

Progress of the First Section

1. Phases: after an introduction and an outline of the problems, the students approached the partial objectives of this section by working at the following topics·

   --definition of the term "energy"

   --listing of energy consumers and the kinds of energy

   --development of energy consumption

   --differences between primary, secondary and available energies

   --development of the global demand of primary energy

   --relations between energy consumption and population size (Western industrialized countries, socialistic countries, developing countries)

   --timetable of the estimated periods of using nonregenerating kinds of energy.

The students' work was interrupted by phases in which the results of their work were written on the blackboard and into the students' worksheets.

After having used an electricity account known to the students, the partial objectives were introduced to promote the students' awareness concerning the main objective "Energy as the Basis of Man's Existence."

2. Ways of teaching: Free discussions and guided discussions concerning the partial objectives prevailed in this section, supported by a film and individual work. The following media were applied in this section: an electricity account, different worksheets, single and serial maps and diagrams for overhead projection, the film "Stored Energy", the blackboard, and copies of the overhead projection diagrams to be used by the students.

Second Section

Theme: Deposits, genesis, exploitation and usage of lignite

Main objectives: The students should recognize that lignite is an important energy basis of the conurbations of Northrhine-Westphalia.

Partial objectives:

The students should recognize: the lignite deposits, the genesis of lignite, the lignite mining, the usage of lignite by briquetting plants and power stations, and the need of lignite-based energy supply of the conurbations of Northrhine-Westphalia.

Progress of the Second Section

1. Phases: After having tested the students' knowledge concerning the kinds of energy the subsequent phases included presumptions, observations, reception of information, and the interpretation of media. Each partial objective was acknowledged and exercises were made by filling in the students' worksheets that included topics concerning the lignite mining as well as the production and transportation of electric power. The results of the students' work were verified or corrected.

2. Ways of teaching: Besides free and guided discussions, this section was dominated by the teacher's actions, the analysis of media and by individual work. Moreover, provocation was used as a means of teaching to let the students react on lignite mining. This section incorporated a variety of media to provoke the students' reactions. Included were overhead projections, a map, photos, and worksheets.

Third Section

Theme: Destruction of a natural landscape and its recultivation

Main objective: The students should recognize that lignite mining destroys a traditional landscape that by means of recultivation can only be substituted by a planned "artificial" one.

Partial objectives:

The students should recognize: the different elements of the destroyed landscape, the increasing impact of destruction, the effect of lowering the groundwater in large parts of the adjacent areas, the stages of recultivation, that recultivation needs some decades, that the area involved is of historical and cultural significance, so that its heritage ought to be protected by archaeological methods, that the local people are confronted with the greatest problems and heavy sufferings, and that parts of the landscape have to be offered for energy production.

Progress of the Third Section

1. Phases: A provocative slide showing the stripped-off landscape was introduced. The students recognized the problems by discussions; the results corresponding to the partial objectives were written on the blackboard. The students were able to derive the main objective from the partial objectives.

2. Ways of teaching: In this section discussions prevailed, supported by the teacher's lectures and individual work of the students. Media supplemented these discussions, and included slide, overhead projections, a brochure, and a worksheet.

Field study

Main objective: The students should be directly confronted with the local problems analyzed in the previous sections; they should reflect the planning objectives; they should interview the people affected.

Partial objectives:

The student will: become acquainted with the open-cast mining field "Fortuna." learn the purposes of the mining company, visit the recultivated areas, interview the people of Konigshofen, a little village which will be destroyed and resettled, and compare the objections and proposals of the "Hambach Area Initiative" concerning an area which will be affected by future mining.

Programme of the field study

8:00 a.m.	Departure from Essen to the Paffendorf Information Centre
10:00 a.m.	Field study excursion guided by a representative of Rheinbraun. Information Centre--Open-cast mining field "Fortuna" - recultivation - interviews at Konigshofen, village to be resettled

1 00 p.m. Lunch

2:00 p.m. Walk through the forest that will be destroyed in near future; discussion with representatives of the "Hambacher Forest Initiative" at Bergheim

Objectives and Progress of the Field Study

Environmental education can achieve optimum success confronting the students directly with the topics involved; the complex aspects will be better recognized by direct observation than by theoretical discussion, even if very profound. The topic "Energy and Environment" implies two particular risks: On one hand students might misunderstand the need of energy production as of absolute priority and might consequently deduce that the destruction of landscape has to be accepted as being regrettable but inevitable; on the other hand, they might reject any exploitation of energy if this would cause landscape damages. To avoid such extreme reactions it is important for students to know the different points of view and acknowledge them. By confrontation of the opposites, they will recognize the necessity of unbiased judgments and personal involvement. In the course of the field study the following aspects should help the students to achieve such unbiased judgments:

--paradigmatic survey of the stages by which the landscape will be changed (geographical aspect)

--changes of landscape and their effects on people (sociological aspect)

--protection of people from hazards and inconvenience (environmental aspect)

The integration of local conditions, the official representatives' statements, and the views of people involved will enable the students to recognize all the aspects mentioned.

The geographical aspect will be perceived

--by a cultural landscape with its nearly natural plant stocks (Hambacher Forest) that will be irretrievably lost

--by the damages of the current mining activities, destroying not only plants and animals but also affecting essentially agricultural areas

--by the backfill that very early reshapes the landscape

--by the reordering of the landscape implying a variety of difficulties and problems in the course of recultivation.

The sociological aspect could be experienced

--by the destruction of local societies in the resettled villages

--by the renewal of social life in new built environments

--by the establishment of new town-centres that are very hesitatingly accepted by the people resettled

--by the problems to indemnify for a destroyed environment as well as for houses and lost locations

--by the evaluation of adjacent areas (creation of new job opportunities by smaller firms)

--by the discrepancy between the protection of old structures and the creation of new ones

--by the financial problems due to the fact that historical but old houses are worth less than new buildings.

The environmental aspect will be perceived

--by the controversy between the mining company and the representatives of the people involved

--by the noise and dust affections and the presumed damages of the people's physical and mental health.

The students' observations and reactions in the course of the field study had four remarkable results. During the meeting with the mining company representative the students asked, with increasing self-confidence, some critical questions about the "voluntariness of resettlements," the "necessity of forced mining" as well as about the "indemnification for the old houses of elderly people." The questions asked were so direct and precise that the lecture of the mining company representative had to go far beyond the usual superficial information. At Konigshofen, a village that has already partly been resettled, the students initiated interviews with the still remaining people by means of recorder. The mining company representative was confronted with the statements received and his replies were judged critically, but unbiased; sometimes he was unable to give a satisfying reply.

In the Hambacher Forst the students learned that tree stocks will be irretrievably destroyed. But they were very astonished when the representative of the local initiative did not deny the necessity of mining. He said, resistance was useless because the public welfare would be predominant; therefore, only a small strip of trees should be saved to protect the housing area.

Finally, by all these conclusions the students were able to discuss effectively with the leader of the initiative, showing both supporting and criticizing attitudes. On their way home their free discussions showed that the impressions they had gained by the field study were persistent.

ENVIRONMENTAL EDUCATION AT DEAKIN UNIVERSITY, AUSTRALIA: AN ISSUE-BASED APPROACH

by Dr. Ian M. Robottom*

Deakin University offers a one-semester curriculum studies unit in environmental education. Deakin's Course Handbook 1982 describes the unit as:

> ...an integrated curriculum studies unit focusing on the teaching aspects of Environmental Education. The two main thrusts to the unit are in curriculum development and in developing environmental knowledge, skills and attitudes in the teacher.

The unit is offered at two different levels to two separate types of student. In the Bachelor of Arts in Education course, the unit is offered as an elective pre-service curriculum studies unit for that course's teachers-in-training. The unit is also offered at fourth year level in the Bachelor of Education course. This course is generally undertaken by already-qualified teachers who are, or have been, teaching. The latter offering is part of Deakin's off-campus program, in which units are presented in written, booklet or "Study Guide" format complete with support materials ("course guide," setting out assessment requirements, suggested study schedule, assignment topics; audiotapes; videotapes) in the manner of Britain's Open University courses. At present, the Environmental Education course enrollment includes students from Hong Kong and Papua-New Guinea, as well as from most states in Australia.

The intentions of the course team responsible for writing the course are captured in the statement of the course's objectives:

--to develop an interpretation of the environmental education concept that can be actualized into curriculum activities;

--to develop a generalizable framework for producing integrated environmental education programs;

--to provide teachers with the opportunity to develop integrated programs for school children using the environmental education curriculum design framework;

--to provide teachers with the opportunity to develop problem-solving skills, knowledge, values and attitudes in the context of people's interactions with their environment;

--to provide teachers with the opportunity to develop competencies in organizing out-of-the-classroom teaching activities.

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The course is to a large extent content-free, in the sense that it does not seek to convey to students a body of environmental information to be learned, either for assessment purposes or for later inclusion in environmental education programs for children. The course does seek to engage students in dialogue about, and pratice in, some processes for environmental education. The course itself is assignment-driven; there is no final examination of students' ability to recall course content. Assessment is by assignments requiring students to practice and reflect upon processes for developing environmental education programs for children.

The written material of the course is divided into two Study Guides; the division reflects the twin thrusts of the course--one in personal development of students as environmentalists, and the other in development of students' abilities in environmental education curriculum.

PERSONAL DEVELOPMENT PHASE: TEACHERS AS ENVIRONMENTALISTS

Study Guide 1 begins by presenting a brief history of the environmental education movement internationally, and on a national level in Australia. Reference is made to the Stockholm, Belgrade, and Tbilisi conferences in environmental education, and to the work in Australia of the Curriculum Development Centre. Later in this Study Guide is Deakin's interpretation of the term "environmental education." An attempt is made to distill from literature of the environmental education movement, and in particular the Belgrade Charter, some key elements which set environmental education apart from other environment-related courses of study. The key elements of environmental education recognized by Deakin's course are: (1) the integrated nature of environmental education; (2) a concern for developing environmental awareness; (3) the problem-solving and activity-centered orientation of environmental education; (4) the decision-making component of environmental education.

The last two key elements, in particular, have led the course team to adopt an issues-based approach. According to this approach, problem-solving skills are best developed in the activity of personal investigation of an environmental issue. Environmental education, then, becomes defined as "the study of the problem-solving nature of man's interactions with his environment." Environmental education is concerned with the processes which determine the final decision for a particular form of environmental exploitation. This definition logically leads to a course of study that includes an issues focus.

The notion of environmental issues acting as "vehicles" for curriculum development is an important one to articulate at this stage:

> Environmental issues provide the vehicle about which the curriculum can be designed. This vehicle carries the teacher and the students across traditional subject

> boundaries. It provides students with the opportunities for acquiring the skills for collecting environmental information, for collating and organizing information into a form that aids the comparison between alternative actions. Environmental issues provide the teacher with contexts within which to develop awareness, attitudes and values in students. Our expectation is that the development of awareness, attitudes, values and appreciations that reflect a concern about man's interactions with the environment and the quality of the modified environment systems are more likely to develop when children are involved in studies of environmental issues than if they are not so involved.

This "issues focus" is expressed in both the personal development and curriculum development phases of the course. The balance of Study Guide 1 is concerned with further developing the notion of an environmental issue through practical involvement. The intention is to further students' personal development as an environmentalist in the belief that success in this direction will result in an increased commitment, on the part of the students, to the implementation of environmental education programs.

Students are presented with a detailed biographical example of a resolved environmental issue. This example illustrates the sort of data and the type of analysis that are appropriate when an investigation focuses on the decision-making phase of an environmental issue. Students are also presented with a view of environmental issues which suggests that issue resolution is rarely achieved solely on the basis of objective, technical data--that subjective factors (emotional religious, political, ethical...) intrude at the decision-making phase and confer a quality of irrationality to environmental issue resolution.

As an assessment requirement of the course, students themselves investigate an environmental issue. Students may work individually or in pairs in this investigation. The issue is selected by the students, but must comply with the following guidelines: (1) it must involve a land-use matter (either urban, rural, or natural) for which alternative action proposals exist; (2) it must be current, in the sense that it is unresolved at the time of investigation; and (3) it must be local and small-scale to an extent that permits the student ready access for firsthand investigation.

Examples of issues investigated by students include the establishment of a motel in a quiet residential street, the establishment of a holiday resort in rural coastal setting, proposed watersports centre in an urban wetlands area, and woodchipping expansion in an ancient forest remnant.

Students are supported in their investigation by the provision of a self-instructional "learning centre" on basic ecological principles, and a brief sample analysis of a representative environmental issue. The latter illustrates a process of analysis which comprises four main steps, and which students are expected to follow: (1) selection and definition of an issue for study (includes identification of "key questions"); (2) follow-up of key questions: compilation of a data profile on the issue; (3) analysis of the decision-making process; and (4) evaluation of proposals and recommendations for action.

The expectation of the course team for students working through this process is similar to that expressed in relation to children in an earlier quotation. In addition of course, it is expected that students "will get a feel for" the type of environmental issue which could serve as a vehicle for developing an educational program--that is, for curriculum development.

CURRICULUM DEVELOPMENT PHASE

The intent in this phase of the unit is to engage students in dialogue about possible structures or organizational guidelines for environmental education programs for children; guidelines which avoid restrictive prescriptions about content and hence are compatible with the likely diversity of tailor-made curricula associated with school-based curriculum design. We do not set out to provide a program of environmental education activities; to do so would be inconsistent with our advocacy of school-based curriculum development in environmental education.

The point is made clearly at the outset that a program exhibiting the characteristics identified earlier in this paper as the key elements of environmental education would constitute a curriculum innovation in most schools. It is our belief that sustained programs in environmental education as earlier defined are not commonplace.

Having claimed that environmental education is a curriculum innovation, and one that ought to be dealt with at the local school level of organization, we recognize the need to resist the temptation to impose a curriculum blueprint--a "foolproof recipe"--for environmental education curriculum development. The next quotation from the Study Guide makes this point:

> The important issue here is the exposure of the assumption that we believe schools/individuals should set about designing a program suitable for the particular setting and should avoid looking for a curriculum blueprint... The selection of specific objectives for a class of children is the responsibility of the class teacher. Teachers, sensitive to the needs, interests and developmental levels of their children, are in the obvious position to choose appropriate objectives.

The issue of objectives formulation in environmental education is a difficult one. On the one hand, the impression that environmental education programs can, or ought to, be developed by a universal, rational, objectives-based model is to be avoided if the notion of environmental education as a school-based, context-dependent process is to be sustained: it is all too easy, given the extant patterns of institutional education, for the existence of a set of specific objectives of allegedly universal application to be used in justification of a teacher-directed, product-oriented style of teaching. On the other hand, it is felt that a set of long-term objectives assists in planning and evaluation of a program, and can, as mentioned earlier, provide a framework from which practical, organizational guidelines can be derived.

Our approach is to outline a process whereby teams of teachers locate some key readings in environmental education, engage in debate about the long-term aids of environmental education, and negotiate for themselves a set of agreed-upon endgoals.

> Endgoals are statements of anticipated outcomes of the total school experience in a given area. In our case endgoals are outcomes for the children of all their school environmental education experiences. They represent our expectation of the destination for school children involved in environmental education programs of learning. They are needed in order to provide for overall direction when involved in designing an environmental education curriculum.

Thus students are engaged in a process of developing their own appropriate endgoals--with "appropriateness" judged relative to the motivations, interests and constraints of particular settings. These context-dependent endgoals are useful for deriving a set of structural guidelines or principles for environmental education program development, and for program evaluation.

The course materials provide an example of this process of endgoal determination--an example based on the course team's own experiences. We include in the materials a number of readings identified by various team members and representing their various perspectives in environmental education, and provide an audiotape of the course team dialogue as an agreed-upon set of endgoals was being negotiated. Further we provide a list of "environmental education principles" which we, as a team of environmental educators, derived from our own set of endgoals and from our own definitional concept of environmental education. A rationale for each principle in terms of our endgoals and our definition is also provided.

Two extracts from Study Guide 2 show the course team's view of the long-term endgoals of environmental education, and the environmental education principles as derived by the course team during the process of course development. These extracts also serve to make explicit the course team's concept of environmental education outlined earlier.

ENDGOALS

1. Attitude and values endgoals

   --demonstrates positive attitudes and values towards the care and conservation of the environment;

   --demonstrates a concern with issues relating to environmental quality;

--is constantly involved in the process of clarification of personal environmental values;
--develops attitudes and values consistent with an appreciation of the equilibrium ethic.

2. Awareness endgoals

--develops a sensitivity for the inherent value of social and natural communities;
--develops an awareness of the interaction between the individual and his social and physical environment;
--develops an awareness of the effects of technology on social and natural communities;
--develops an awareness of the fact that accompanying the capacity for change is the responsibility for maintaining the environment;
--demonstrates the ability to enhance awareness by drawing upon such fieldwork skills as viewing, examining, analyzing, collating, sampling.

3. Problem-solving and decision-making skills endgoals

--develops skills for obtaining relevant information on local environmental issues;
--demonstrates an awareness of alternative courses of action for realistic problem solving;
--have had practice in decision-making and in formulating action plans;
--develops an appreciation of the irrational aspects of environmental decision-making;
--develops a healthy scepticism for unsupported opinion and opinion supported by an imbalance of evidence;
--become independent thinkers and be able to support one's own opinion for environmental action in a logical and articulate manner;
--demonstrates a preparedness to influence the resolution of environmental issues.

ENVIRONMENTAL EDUCATION PRINCIPLES

1. Activities in environmental education should be related to the intellectual, physical and emotional capacities of children.

2. Environmental education should be interdisciplinary--information and skills should be drawn from a number of subjects to bear on a common environmental issue.

3. Environmental education activities should involve children in direct firsthand experiences with aspects of their environments.

4. Environmental education activities should commence in the familiar environment of the home and school and then progress to other less familiar surroundings.

5. Environmental education activities should be graded with respect to the previous sensitization experience of the children.

6. Environmental education programs should place children in a situation in which a choice is required between two or more alternative courses of action.

Endgoals and principles such as those listed above can be regarded as components of a teaching framework within which a teacher can function in designing and developing programs of environmental education experiences for young children. Another component, however, which needs to be taken account of in the teaching framework is the role of the teacher when interacting with children in the classroom--that is, "appropriate" teacher behaviours.

The course team rejects the view that there is no single style of teaching best suited to environmental education. We are of the opinion that given the environmental education endgoals listed earlier, it is possible to infer some particular teaching behaviours as being "appropriate" in the sense of being likely to enhance the attainment of those endgoals.

To summarize briefly, during a section of the course in which we consider such notions as issues-investigation, facilitation, values education, and nondirective teaching, as well as providing students with the opportunity to analyze a number of transcripts of actual teaching/learning interactions, the course team argues that a nondirective, inquiry teaching approach is the most appropriate in terms of the endgoals of environmental education. The course team's position on the issue of teaching behaviours and environmental education is presented below:

The Nondirective Teacher and Environmental Education

> We believe that our endgoals are more likely to be achieved by children who have been exposed to teaching behaviours that consciously focus on advancing student autonomy and self-directed learning, on developing capacities to make assessments and to take action and on developing critical awareness. Support for this stand has been presented in the earlier section on Curriculum Principles and in the previous general discussion on teaching approaches compatible with problem-solving, decision-making and values education. It is at this point teachers need to carefully reflect upon their behaviours when interacting with children and think through the ramifications of traditional, good teaching behaviours. If children are to develop towards acquiring problem-solving and decision-making abilities, and towards dependable environmental values then they require opportunities to develop confidence in their own thinking and judgments and to develop a critical attitude (in the positive sense). In other words, the children should be encouraged to develop an independence of thought in the school setting.
>
> The encouragement of independence with respect to children's thinking is an integral component of environmental education

> programs that embrace a process view of knowledge and curriculum. We are of the opinion that if a teacher's accustomed style of teaching is oriented towards imparting factual information as a prime goal then the teacher's habitual teaching behaviours may well be an obstacle to successfully establishing an environmental education program with strong problem-solving and decision-making components and with a commitment to values development.

We proceed to identify some specific behaviours which we believe are entailed by a nondirective approach to teaching:

1. the avoidance of behaviors likely to maintain the teacher's authority with respect to knowledge, such as asking leading questions or making leading statements, rejecting or discouraging responses or ideas, reinforcing responses or ideas with praise or other forms of positive evaluation, inviting consensus and then rephrasing the children's comments in a summary and/or conclusion which contains more of the teacher's ideas than the children's;

2. acting as a resource person to assist in the coherent flow of a program;

3. creating a climate which fosters free expression of ideas without fear of criticism;

4. extending the children's thinking without taking control of the activity;

5. provision of opportunities for clarification of personal environmental values;

6. provision of opportunities for making assumptions and testing hypotheses relating to environmental issues;

7. allowing the activities to carry the program along.

The adoption of a clear stance with respect to "appropriate" teaching behaviours, together with the definition of environmental education, the list of endgoals, and the environmental education principles, enable the "fleshing out" of the course team's environmental education teaching framework. The relationships between these elements of the framework, and the actual program of activities which a teacher/group of teachers operating within such a framework might generate, is represented in Figure 1.

Teaching Framework

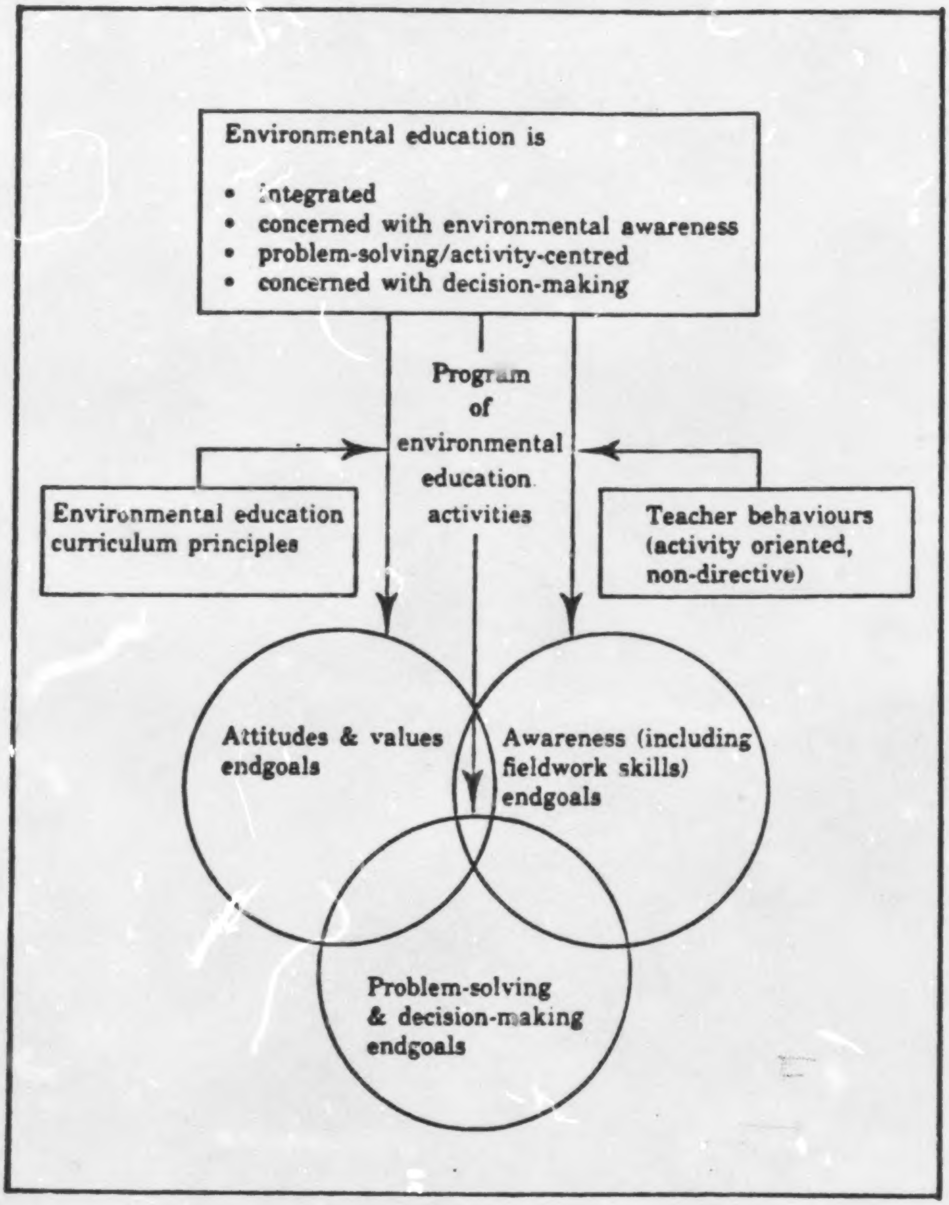
Environmental education is
• integrated
• concerned with environmental awareness
• problem-solving/activity-centred
• concerned with decision-making
Program of environmental education activities
Environmental education curriculum principles
Teacher behaviours (activity oriented, non-directive)
Attitudes & values endgoals
Awareness (including fieldwork skills) endgoals
Problem-solving & decision-making endgoals

Figure 1

The "program of activities" component of the teaching framework is not considered in detail. To fill in substantive detail relating to that component would be to ignore our prior advocacy of a school-based locus for environmental education curriculum development. However, we do provide some support to students wishing to work within the teaching framework in developing a program of activities in environmental education (this in fact is a requirement of the course).

The support we offer is in the form of a suggested procedural model in environmental education curriculum design, together with a number of "learning centres" which comprise a brief rationale and sample activities for each of the environmental education principles identified earlier. A diagrammatic representation of the curriculum design model is presented in Figure 2.

Curriculum Design Model

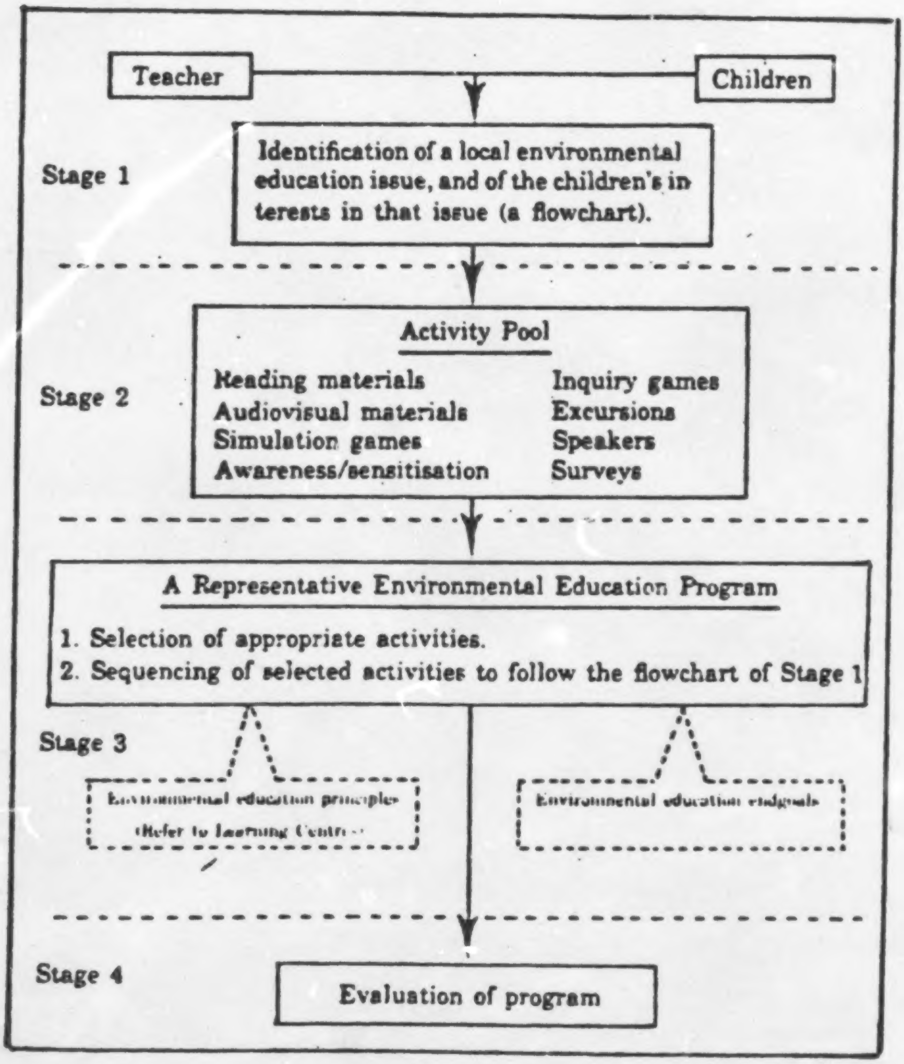
Teacher
Children
Stage 1
Identification of a local environmental education issue, and of the children's interests in that issue (a flowchart).
Stage 2
Activity Pool
Reading materials
Audiovisual materials
Simulation games
Awareness/sensitisation
Inquiry games
Excursions
Speakers
Surveys
A Representative Environmental Education Program
1. Selection of appropriate activities.
2. Sequencing of selected activities to follow the flowchart of Stage 1
Stage 3
Environmental education principles (Refer to Learning Centres)
Environmental education endgoals
Stage 4
Evaluation of program

Figure 2

In the Study Guides, a more detailed, written account of this suggested design model expands the three stages. In Stage 1, students are encouraged to tap the children's interests in identifying a local, current, manageable environmental issue. The suggested approach involves excursions to sites of such issues (the issues are nominated by the children), a democratic choice of which issue to investigate, and a "brainstorming" of the elected issue for the purposes of identifying possible lines of inquiry to pursue.

This stage exemplifies the sense in which the curriculum development process is seen as issues-based and child-centered. The elected issue, guaranteed by the process of its identification to be within the arena of interest of the class of children, acts from this initial stage in the program development as a vehicle for carrying children through a coherent, purposeful series of environmental education activities. The issue, once identified, serves as a context for out-of-the-classroom awareness and attitude-development activities, and for involvement in the investigation of the decision-making phase of "real-life" issues whereby children can obtain experiences in the "irrational" aspects of environmental decision-making. The latter also affords opportunities for personal values clarification, and formulation of a plan of action in respect of the issue.

In the view of the course team, the primary benefit of an issues-based approach is its potential for providing a concrete, real-life context for making decisions about program development--a context which enables many of the key descriptors of environmental education to be operationalized. A key feature of the issues-based approach is that as an organizing principle, it is supra-disciplinary by imposing an orientation (the investigation of the issue) that stands beyond the objectives of particular disciplines, and may serve to overcome the disciplinary thinking that seems to characterize much of what goes on in the name of environmental education. A secondary benefit is that the children may learn something substantive about the issue itself and may generalize their understandings from particular issues to larger-scale "big" issues of like genre.

The second stage suggests that students compile an extensive pool of activities related to the lines of inquiry identified in Stage 1. A range of resources is expected (excursions, visiting speakers, audiovisual, textual, inquiry) with a large proportion involving children in direct, firsthand experiences with aspects of their environment. It is anticipated that the activity pool include a greater number of activities than would be used in any single program.

Stage 3 requires students to select and sequence activities from the pool of Stage 2 into a coherent environmental education program. Students are expected to conduct a type of formative evaluation of the program: the inclusion of each activity is to be defended or accounted for in terms of the student's own set of environmental education endgoals, and in terms of the set of structural principles derived from the endgoals.

SUMMARY

This one-semester unit in environmental education aims to assist generalist teachers in their school-based development of interdisciplinary environmental education programs for children. Its objectives include the development of a generalizable teaching framework for producing environmental education programs which exhibit four key elements: (1) the integrated nature of environmental education; (2) a concern for developing environmental awareness; (3) the problem-solving and activity-centered orientation of environmental education; and (4) the decision-making component of environmental education.

The two phases of the course--personal development of teachers as environmentalists, and development of programs of activities for children--are conducted in a context of investigation of local, current, relatively small-scale environmental issues.

Experiences gained in operating the course tend to confirm that in environmental education, we are still confronted with such matters as:

1. the problem imposed by entrenched disciplinary thinking at all levels of formal education for interdisciplinary environmental education;

2. the view that a "certain amount" of awareness development (that is, education about the environment) is necessary before moving into an investigation of environmental issues;

3. the predisposition of environmental education to a conventional, direct style of teaching which acts as an impediment to its aims of developing students' abilities for acting effectively as independent agents in influencing the resolution of environmental problems; and

4. the perceived political connotations of an issues-based approach which act as a constraint in the manifestation of such an approach in the classroom.

AN INTERDISCIPLINARY ENVIRONMENTAL EDUCATION PROGRAMME IN AN OLD, TRADITIONAL UNIVERSITY

by Dr. Lars Emmelin and Susanne Soderlund (Sweden)*

FACING THE PROBLEM OF CHANGE IN AN OLD, ESTABLISHED INSTITUTION

A major problem for environmental education in existing universities is its interdisciplinary nature. Several studies have indicated that environmental education, as a rule, faces greater problems in old, established university systems (Emmelin, 1975). This is particularly true in the European countries, where strong, often autonomous, discipline-oriented universities tend to resist change in undergraduate curricula. The Environmental Studies Programme of the University of Lund represents a successful innovation in an old, established European university.

This paper intends to describe the operation of the programme after its initial period of introduction. The intention is to describe some of the features of the programme as it has matured. The process of introducing the programme, forces working for and against the innovation, and an analysis of the process of introduction have been described by Berg & Ostergren (Berg & Ostergren, 1977). On the topic of the introduction of the programme, these two researchers, not being directly involved with the programme and having studied it in a larger context of innovations in higher education, should be consulted.

ORGANIZATIONS AND FUNCTIONS

The Environmental Studies Programme--the ESP--was established at the University of Lund in the autumn of 1969, following a resolution of the University Council. This decision was preceded by a trial period of activities including a course in Environmental Studies in 1968-69.

The ESP is directed by a governing board with representatives from the faculties or schools of the university, the unions, and the students. In other words, it does not fall under the authority of any one of the traditional faculties of the university but constitutes an independent body directly under the Vice-Chancellor's office. The interdisciplinary character of the Environmental Studies Programme in matters of education is maintained, for instance, by using teachers from different university departments and also, to a large extent, from outside the university.

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The activities of the ESP are financed partly through the University Council and partly through specific research grants. Current matters are handled by a Programme Director, two Directors of Studies (for Environmental Studies and Work Environment Studies, respectively), and individual project managers.

According to the instructions for the ESP given by the University Council, the Environmental Studies Programme should:

--plan and implement undergraduate university education in the field of environmental sciences,

--work for a continuous renewal of environmental education at the university,

--act as coordinator in environmental matters, as directed by the University Council and the Vice-Chancellor's office,

--follow the public discussion on environmental questions and take or recommend to the Vice-Chancellor's office, appropriate action.

The main functions of the ESP are:

--education (mainly at undergraduate level)

--educational planning and development

--research, policy and future studies

--information

--international cooperation.

TEACHING PROGRAMME

Approximately 200 students each year participate in the courses given by the Environmental Studies Programme.

Environmental Studies

The core of the programme in environmental studies consists of Environmental Studies, 10 credit/weeks, which was the initial course developed by the ESP. It is an overview course, which gives a general introduction to the field of environmental science.

Previously, the ESP ran a 40 credit/week study programme as its most comprehensive, interdisciplinary, environmental science course. In 1980, this was replaced by a package of courses better suited to the system of university education introduced by law in Sweden in 1977. The base consists of Environmental Studies, 20 credit/weeks, which includes a 10 credit/week lecture unit, providing basic knowledge, and an applied project covering the additional 10 credit/weeks. At present, the package then includes the following 10 credit/week programmes: The Ecology and Economics of Natural Resource Management, Environmental Toxicology, Environmental Measurement Techniques, Applied Environmental Studies, Air Pollution Control, Wetland Resources Management, Energy/Natural Resources, and Waste Disposal Management.

The aim of the various courses is to serve as a supplement to previous professional training or to constitute an element in undergraduate education at university level.

Work Environment Studies

This programme consists of a block of four courses, of which the first two may be studied separately. The programme covers the following:

- --Ergonomic, physical, chemical, and psychological work environment factors.
- --The labour market, labour law, and personnel administration.
- --Medical bases and technical measures for correction of work and the work environment.
- --Applied occupational health and work environment studies.

Environmental Studies at the Lund Institute of Technology

The Environmental Studies Programme has developed courses in environmental studies to fit into the teaching programmes of the different schools of the Institute of Technology. At present, there are two courses in environmental studies. The first is an overview course (comparable to the Environmental Studies 10 credit/week overview programme), and the second is project-oriented. These courses can be studied as elective courses and may be included in a degree at most schools.

Miscellaneous Courses

The ESP conducted a number of courses for shorter periods of time, e.g., one in Human Ecology, 10 credit/weeks, and one within the Graduate Psychology Training Programme called "Studies of and Corrective Measures Concerning the Physical Environment," 10 credit/weeks. After development and modification by the ESP, the course was transferred to the Behavioural Sciences Division at Lund.

There is also a special in-service programme for professionally active, municipal health inspectors. This was developed on a national scale and coordinated by the Department of Environment and Health at Umea University. So far, the Environmental Studies Programme has run 10 credit/week courses on Urban and Regional Planning and developed a course on Environment and Hygiene in Domestic Housing. The teaching covers three weeks at Lund spaced out over the term, allowing the students time to work on their own.

Post-Graduate Level Courses

Since 1973, the Environmental Studies Programme has conducted a course in Trace Element Analysis designed for graduate students in different sectors. Participants have, however, mainly covered the fields within the natural sciences, technology and medicine, but professionals from municipal public health committees and industry have also taken part.

Cooperation with Outside Organizations

The ESP cooperates actively in planning and carrying out of environmental education with labour market organizations and agencies. As a joint venture, the Environmental Studies Programme and the Labour Movement Working Group for University Education and Research developed two five credit/week courses, covering Noise and Chemical Health Hazards, respectively. After a preparatory period, the latter was transferred to one of the chemistry departments at Lund. These two courses have been offered at a number of places in the southern part of Sweden.

In cooperation with the National Farmers' Union and agencies concerned with agriculture, a course and seminar series concerning Energy and Environment in Agriculture, 10 credit/weeks, has been carried out. This course and seminar series aims at bringing active farmers into direct contact with scientists working with energy and environment problems. Apart from disseminating information, the objective is also to provide feedback from active farmers to research workers.

EDUCATIONAL PLANNING AND DEVELOPMENT

The aim of the Environmental Studies Programme in educational planning and development is to promote development at four different levels of education:

- --integration of environmental questions into all types of education and courses,
- --overview and introductory courses,
- --professional/vocational, and specialist training,
- --supplementary education.

The efforts of development are aimed both at improving and revising the ESP's own courses, and at establishing new types of activities within other institutions. Of great importance to this is the research carried out at the Environmental Studies Programme as well as the participation of ESP staff in investigations and development work, on both a national and an international level.

RESEARCH AND INVESTIGATION

From 1969 on for a number of years, the Environmental Studies Programme compiled and published an annual catalogue of environmentally oriented research at both the University and the Institute of Technology at Lund. Both current research and suggested projects were included, the latter having been supplied by authorities, companies, organizations, and private persons.

Research activities were initiated in 1975 with the project "Energy and Society" for the Secretariat for Future Studies. This study produced a number of internationally widely acclaimed reports on Sweden's energy future. At present, research activities are being pursued within the project "Future and Strategic Studies in Energy" with grants from the Commission on Energy Research and Development. This commission, as well as the National Board for Energy Source Development, supplies grants for studies concerning environmental restrictions and questions of planning and introduction of such technologies as biomass, wind power, marine algae cultivation, etc. Nordic studies concerning energy systems and environmental effects of renewable energy sources are currently in an introductory phase.

The Swedish Council for Planning and Coordination of Research supports a project concerning the future development of the Swedish landscape. The object of this project is to develop methods that facilitate the understanding of the visual aspects of the processes of change in the landscape. In cooperation with the artist, naturalist and writer Gunnar Brusewitz, a method for visual impact analysis has been developed. A few minor studies about the use of natural resources are also being conducted under funding from the Swedish Council for Planning and Coordination of Research.

On grants from the National Commission on Natural Resources and the Environment, a number of projects and seminars concerning environmental research, natural resources education and issues related to the concept of an ecological perspective in planning are being conducted at the Environmental Studies Programme.

Staff at the ESP has participated in a number of official activities, including the Energy Commission's expert panel on environmental and safety aspects, the Commission on Natural Resources and the Environment, the Energy Program Committee, the Commission on Energy Research and Development, the Inter-Departmental Working Group for Environmental Education, and the Executive Committee of the National Nuclear Power Inspectorate.

INFORMATION

The Environmental Studies Programme's comprehensive network of contacts accounts for a great number of inquiries about topics such as environmental problems, education, energy issues, etc. from within Sweden as well as from other countries. An important function is to assist people in finding the expertise they are seeking within the university. The ESP is registered as a "source of information" in the international information system designed by the UN Environment Board and serving as a guide mainly for inquiries from developing countries.

INTERNATIONAL ACTIVITIES

For a number of years, ESP staff members have participated in Nordic working groups for environmental education under the Nordic Council of Cabinet Ministers. At present, a series of specialized conferences for teachers in different sectors is being conducted under the management of the Nordic Council of Cabinet Ministers.

A number of comprehensive studies on environmental education have been made for the Council of Europe, Centre pour la Recherche et l'Innovation dans l'Enseignement (CERI) of the OECD, Unesco's Environmental Education Section, the Governing Council of the UN Environment Programme (UNEP), Centro Internacional de Formacion de Ciencias Ambientales (CIFCA) in Madrid, Wissenschaftszentrum Berlin, and the International Council for Adult Education (Dar es Salaam).

In addition to a number of magazine articles and conference reports, the environmental education activities have resulted in a number of publications.

In the field of energy there has been extensive cooperation with inter alia the Norwegian Department of the Environment, the University of Oslo (Radet for Natur-og miljofag), the Danish Institute of Technology (Fys Lab III), Princeton University (USA), and the University of Tasmania (Australia).

CONCLUSION

In this paper we have tried to describe briefly the activities of a nontraditional, interdisciplinary, environmental education programme operating within the confines of an old, established university.

A number of aspects deserve attention in this respect.

The ESP is placed outside the normal administrative structure, directly under the Vice-Chancellor's office. It also has its own budget. By designing and running courses on its own budget, the ESP is able to draw upon the resources of the entire University and the Institute of Technology. It is, however, not confined to teaching within the University. Nor is it strongly dependent on the institutes of the University. The freedom to specify and choose is an important element in maintaining interdisciplinarity.

The Environmental Studies Programme deals with all aspects of environmental problems: natural resource management, energy, the physical environment, planning, and work environment and occupational health. We believe that it is important not to separate environmental studies from work environment, natural resources, and planning.

The ESP has strong links with agencies and organizations outside the University. Since environmental problems are not traditional academic problems, but rather applied problems generated in and by society, such links are essential. Scandinavian universities have traditionally not had strong links with society outside.

Although focusing on undergraduate education, the ESP also has an active research branch. Policy and future studies in these areas are important in providing innovative approaches and expertise for educational planning and development in the area.

Science is essentially internationalistic in outlook. However, undergraduate education and organizations dealing with educational planning and management normally tend to be much less internationally oriented than research institutions at Swedish universities. The ESP has successfully broken this trend.

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PHILOSOPHY, METHODOLOGY, AND HISTORY OF ENVIRONMENTAL INTEGRATIONISTS TRAINING--AN EXPERIENCE OF A DEVELOPING COUNTRY

by Dr. Nart Tuntawiroon (Thailand)*

DEVELOPMENT AND ENVIRONMENT

Economic development is not an end in itself but merely a means to an end. That end may be termed "better quality of life for more people." Raising people's income is no certificate of that larger income does not bring more resources and better environmental quality to a larger number of people. This may sound paradoxical but the phenomenon is quite universally forming the basis of environment and resource studies the world over. Economic development usually entails increasing production which in turn implies consumption of more resources. It thus inevitably leaves less resources for future use. Also, the very process of production is usually associated with degradation of environmental quality, as wastes must be discharged into the media which sustain life itself, namely--air, water and soil.

Furthermore, if the development process is not closely coupled with fairer distribution of income the result is usually opposite to what has been desired. A minority may be quite well off through their successful exploitation of resources, reflecting in an apparently healthy growth of G.N.P., whereas in fact a large majority may be suffering from having less resources to extract and a poorer environment to live in. The existence of this phenomenon is implicit in any development plan which fails to reduce the gap between the rich and the poor--Thailand's included.

One good thing about the present energy crisis is that it serves admirably to highlight the mistakes of our past development strategies. It has wakened us up to the reality that in our headlong rush to catch up with developed countries we may have taken the wrong paths. Importation of Western technology in toto means replacing the low-energy, labour-intensive and thinly distributed traditional activities with high-energy, capital-intensive and densely concentrated modern activities. This change in the mode of living of the people makes the country more and more dependent on energy, and consequently the impact of energy crisis is much more crippling than it should have been, had we taken the soft energy paths. Without energy, the investment in highways, factories, etc., is converted from asset into liability, while the people who have been replaced by machines or moved from rural agricultural land to urban factories find themselves out of work.

Even the infrastructure which was supposed to alleviate the energy crisis such as hydroelectric power let us down completely, when it was reluctantly admitted that many of our dams did not hold much water,

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owing to the destruction of watershed, sedimentation and over-optimistic prediction of rainfall during the planning stages. During the time of drought we were also informed, to our surprise, that we had to make a choice between the use of water for irrigation and for power generation, in spite of the fact that we had always been led to believe that the dams were supposed to be multi-purpose. We are, therefore, quite justified in taking a rather dim view of the various propositions by hard energy proponents to solve the energy crisis by an ever-bigger and more complicated technology such as nuclear power. If past performance is any indication of future success then it is almost certain that this path will lead us deeper and deeper into the energy and envirormental cul de sac.

Modern agricultural practices did not fare much better either. So much hope had been pinned on the success of the green revolution which turned out to be just an illusion. Thai and foreign experts alike had been busy for years persuading Thai farmers to go for mechanization and fertilization. Their success was evident in the rapid displacement of buffaloes by tractors on the rice field, and the increase by leaps and bounds of fertilizer import. The poor farmers were thus caught off-balanced by the energy crisis, when it was found that in order to double the output of the so-called miracle rice, as much as ten times the energy subsidy input might be required.

All the foregoing examples serve to illustrate why our past development strategies need to be re-examined carefully, in the light of their poor past performance (Tuntawiroon, 1980). A main theme of study at the Faculty of Environment and Resource Studies, Mahidol University is thus aimed at better understanding of the linkages between economic development on one hand and resource and environmental systems on the other. It is hoped that the result will yield a more effective method of economic development planning, based on sound ecological principles, aimed at substainability, instead of quick growth, through wasteful and indiscriminating exploitation of resources, without due regard to the environment, that will lead eventually to collapse of the total system.

TRAINING OF ENVIRONMENTAL INTEGRATIONISTS

This idea was borne out of our belief that the planning and management of natural resources and the environment for today's and tomorrow's world are too complex to be left in the hands of specialists who have too narrow a view to be able to perceive the world in a holistic manner. On the other hand, the generalists as we know them, are usually thought of as Jacks-of-all-trades who are too shallow in their understanding of anything in particular to be left in charge of such difficult and important tasks as the planning and management of natural resources and the environment.

It is our conviction that such a task is no longer the domain of an individual, but must be carried out by an interdisciplinary team, each member of which must be quite competent in his own field, and yet be able to work with one another in harmony towards a unified objective.

This is of course much easier said than done; and training for such a purpose cannot be easily accomplished. It can perhaps be likened to an orchestra, each member of which must not only have a complete mastery of his own individual instrument, but also be able to perform together in perfect harmony in order to produce a symphony of acceptable standard. Everybody will appreciate the difficulty of training such an orchestra.

We. therefore, reject the idea of training environmental specialists at undergraduate level altogether as being too shallow to be of any value. At postgraduate level we can ensure that each student has already demonstrated his ability to master one field of specialization, which he has chosen to be his career, and which we encourage him to retain as he goes through the course of training to be an integrationist. Those with a Bachelor's degree in various fields of specialization such as science, engineering, economics, law, and education are admitted to this course.

In the first year they are given instruction in a broad range of topics specially designed to give them a holistic view of the environment. Systems Approach Cybernetics and Simulation Modeling are used as the binding elements for the various subjects taught in the course. Students are encouraged to exchange their views and experiences with others from different backgrounds, thereby contributing to the cross-fertilization process. The active-learning and problem-solving methodology is employed throughout. The first year is in fact used to expand the horizontal view of each student.

His vertical view, or the depth of his knowledge, will be increased in the second year when he starts doing research, preferably in his original field of specialization. An engineer, for instance, may select the topic "Waste Treatment for Sugar Mills," whereas for an economist a thesis entitled "The Diseconomy of Traffic Congestion" may be appropriate.

Graduates from this course will thus not lose their original identities. They will remain engineers, architects, lawyers, economists, educationists, etc., but obtain an extra qualification of being able to integrate environmental and resource dimensions into their professional thinking and practice. Of equal importance, they will be able to communicate effectively with one another. This ability to work efficiently as a member of an interdisciplinary team is one of the most important assets as already stated.

BASIC PHILOSOPHY

This course is based on the following points of conviction:

1. That ecology is a most suitable place of marriage between biologically oriented science and mathematically inclined one.

2. That environmental science and resource management are interdisciplinary in nature; and hence must be taught in an integrated manner. The central theme is systems approach which ensures total concept, not fragmented one.

3. That there is a strong interrelationship between ecology and economics; and therefore ecological planning must go hand in hand with economic development to ensure optimum use of natural resources and the environment.

4. That economic planning based on political expediency must of necessity be aimed at short-term benefit, and inevitably promotes maximum exploitation of resources; whereas environmental planning based on sound ecological principle strives for long-term life-sustaining capability, and consequently opts for conservation of resources; the main difference between the two is thus of time perspective.

5. That ecologists and environmentalists must not divorce themselves from politics but must participate increasingly in decision-making process of the government, and assume more responsibility in planning the development of the country, particularly in lengthening the time perspective of economists and politicians.

6. That the most desirable way of training resource and environmental planners and managers is through an interdisciplinary course aimed at producing integrationists, with holistic views of the resource and environmental systems, as distinct from specialists, or generalists.

HISTORICAL DEVELOPMENT

This interdisciplinary M.Sc. Programme in Technology of Environmental Management conceived in 1972 (Tuntawiroon, 1973), apart from being the only one of its kind in Thailand, also has a unique history which may be worthwhile tracing back a little to highlight the rather unusual situation at its inception.

It is perhaps no exaggeration to say that during the early seventies student movement in Thailand was among the strongest in the world, as none of its counterparts in other countries could claim the same degree of success comparable to our 14 October 1973 student revolution which overthrew the military regime that had ruled the country for 27 years. Of course, there were many elements in this student movement, but one of the most important was the environmental movement which had direct link with the origin of this M.Sc. Programme and that of the Faculty of Environment and Resource Studies at Mahidol University.

The students' environmental activities started with the formation of clubs and groups at a multitude of higher educational institutions under such names as Natural Resource Protection, Environmental Conservation, Ecological Action, etc. Students were encouraged by adult environmentalists to divert their excess energy of youth from violence, which was prevalent at that time, to nature--learning to love it, and acting as a watchdog to guard over it. The success was quite electric as the students overflowed with enthusiasms and took it in their great stride. They strongly supported the environmentalists in many national issues, notable among which were the successful protests against the construction of a hydroelectric power dam in Kao Yai National Park, the use of nuclear bomb to excavate Kra Isthmus in Southern Thailand in order to make a canal linking the Indian Ocean with the Pacific, the pollution of Mae Klong River by the sugar mills, and the import of pollution from Japan.

The climax of the matter arrived with the Tung Yai Wildlife Reserve Scandal which has by now become a historical event. It happened in April 1973 when the students caught high-ranking army and police officers red-handed hunting in a wildlife sanctuary, using an army helicopter that accidentally crashed. The students demanded that the officers involved be duly punished. When the government rejected their demand on the pretext that the officers had not been hunting, but sent there on a secret mission, the students refused to believe the story and confrontation ensued. At that point the protest became nationwide, as the people expressed their full sympathy and agreement with the students, and stood solidly behind them in their demand against the military regime. When the government finally yielded, the students were suddenly made aware of their own immense power when fully united on an issue of national importance. After a few more tests of strength, the military government collapsed six months later in October 1973. It can thus be said that the Tung Yai scandal, which was the work of the environmental movement, was the turning point in the whole student movement leading to the 14 October revolution.

After the revolution the environmental movement in Thailand has become well known to the public. Students who were invited to participate in the drafting of the Constitution took the opportunity to include the conservation of national heritages, natural resources and the environment into a few sections of the Constitution. This was indeed a novelty by any standard. It was amidst this upheaval that Mahidol University finally gave the consent, on 26 September 1973, to the long request to establish the Environmental Education and Research Project which was later to become Faculty of Environment and Resource Studies. As a result, the M.Sc. in Technology of Environmental Management Programme commenced in academic year 1974.

It can thus be seen that the faculty and the M.Sc. programme have quite a stormy beginning by any standard. Their origin was in the environmental movement rather than in the academic establishment which was quite suspicious of the movement at the very beginning. It was with great reluctance that the university came to adopt environmental education and interdisciplinary teaching under its wings; although it must be said that the opposite is now the case, since it is quite fashionable to do so at present.

Being established by the bottom-up instead of the top-down process, the faculty and its students still retain their strong grass-roots connection and are more active than passive in nature. They are encouraged to learn rather than be taught. They are also aware of all the big national issues and actively participate in many of them. It was the faculty which spearheaded the movement for environmental legislation in Thailand. It went as far as taking the initiative to draft the Improvement and Conservation of National Environmental Quality Act, creating the National Environment Board and its permanent Office of the Secretariate. After a long lobby with the government and the national legislative assembly, the Act was promulgated on 12 February 1975, marking yet another milestone in the history of environmental conservation. Although the NEB is not as effective as it should have been, many of the faculty's graduates are still working there, and hopefully their influence will be for the better of all concerned. Full credit must also be given to the faculty for the shelving of the plan to construct nuclear power plants in Thailand. Even at present (June 1982) the faculty is fully engaged in the controversy regarding the construction of Nam Chone Hydroelectric Dam which would flood part of the historic Tung Yai Wildlife Sanctuary. The indication is that it will be a long-drawn battle, the outcome of which is still unknown.

PROGRESS EVALUATION

According to the original brochure of the Environmental Education and Research Project, the objectives were spelled out in the following terms. "The intention was to create an academic institution which would inject more scientific thinking and rational judgment into these sometimes high-charged-with-emotion issues. Apart from fulfilling its usual functions as a seat of learning by providing facilities for teaching and research, this institution is expected to perform another important role as a meeting ground between environmental activists and responsible authorities, where differences would be ironed out in a cordial and rational manner, to prevent confrontation and stalemate which would benefit nobody."

One obvious question is "To what extent have the objectives been achieved?" An honest answer to this question would be "Quite considerable." Of course the trial has not been an easy one but the experience accumulated after nine years of running the M.Sc. Programme has been most valuable, and the result quite encouraging. The programme started off as an easy winner, becoming at once the most popular post-graduate course in the country, having an average of 500 candidates per year vying for the 15 places available (later increased to 20). It still retains this leading position with great ease, as all its imitators have flopped by comparison.

Although the graduates from this programme are few in number, they form the top of the pyramid of the hierarchical system; and therefore their impact on the society is quite considerable. As decision-makers, they exert considerable influence on the planning and management of natural resources and the environment on such a large scale as those encountered in various development projects. As environmental educators, their contribution is compounded many a time since they act as multipliers. In Thailand, graduates from this programme are now highly sought after as the value of their work has gradually gained recognition from their employers who now range over a wide spectrum of activities--National Environment Board, National Energy Authority, Ministry of Agriculture, Industry, Health and Education, to name only a few.

The students of this programme can start contributing to the society even before their graduation in two important aspects Firstly, their studies are strongly problem-oriented and geared towards immediate practical application. Such a thesis as "An Economic Evaluation of Land Degradation Through Crop Nutrient Removal by Cassava, Sugar Cane, and Maize," or "Development of Guideline for Constructing Environmental Education Curriculum for Secondary School in Thailand" can be immediately made available for practical use. Secondly, the role these students play in environmental activities make their contribution quite significant. They are more mature and better informed than other students. They can thus command respect and trust of their fellow students and consequently are in good position to communicate with them on any environmental issue. They are the focal point of environmental activities, providing scientific information and rational judgment. They publish an environmental newsletter; organize lectures, seminars, panel discussions and public debates; arrange field trips and expeditions, etc. This is, in fact a very effective form of environmental education which cuts across the conventional barriers that divide educational systems into universities, schools, out-of-school, etc.

INTERNATIONAL IMPLICATION

We submitted the account of our experience in training environmental integrationists at the International Workshop on Environmental Education in Belgrade (Tuntawiroon, 1979b). At the Regional Meeting of Experts on Environmental Education in Asia our suggestion on this topic was adopted as Recommendation No. 6 (Tuntawiroon, 1976). The Asian group resubmitted this idea at the Intergovernmental Conference on Environmental Education in Tbilisi where the matter was again adopted in Recommendations 11(ii) and 36(ii)(Tuntawiroon, 1977).

Recommendation 36(ii) of the Tbilisi International Conference was strongly endorsed by Recommendation (1) of the Regional Workshop on the Teaching of Environmental Education at the Graduate and Post-Graduate Levels held in Australia (Unesco, 1979), and the same matter was reiterated again in Arlon, Belgium (Tuntawiroon, 1979a).

So the concept of training environmental integrationist is now accepted universally. What then will be the direction of development? In 1982, nine years after we started at Mahidol, an international cooperation endeavour commenced. Faculty of Environment and Resource Studies, Mahidol University in Thailand and Graduate School of Environmental Science, Monash University in Australia have jointly embarked on an academic exchange programme for both students and staff of the two institutions. Australian Universities International Development Programme (AUIDP) has graciously blessed the scheme with financial support. We are quite excited with our new international joint venture which hopefully will generate fresh ideas, vitality and experience for the benefit of all concerned. Any other institution with the same interest and activity would indeed be most welcome to join the club.

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THE PHENOMENOLOGICAL MATRIX: A METHOD FOR ENHANCEMENT OF ENVIRONMENTAL AWARENESS AND DESCRIPTIVE SKILL

by Dr. Federico Pannier* and Orlando Ruiz** (Venezuela)

One of the greatest difficulties faced by environmental education in Venezuela is the translation of the existing general interest in environmental problems into individual actions, in order to contribute to the solution of these problems.

Within the frame of formal and nonformal environmental education, most of the programs developed in the country suffer from a remarkable absence of the basic principle of environmental education; that is, the need for integration of the biological-ecological knowledge into the economic and social aspects of human behaviour. It seems to us that most of the efforts which have been developed to establish environmental education in Venezuela have focused mainly on the isolated treatment of the biological facts of nature and natural resources in a more theoretical way and in the frame of the classic view of conservationism.

This isolated approach is the reason why the necessary change of attitudes to cause the urgently required enhancement of environmental quality has not been reached. Therefore, the isolated efforts undertaken by official and private institutions, through programs such as teacher recycling, campaigns for garbage collection, noise diminution, car pollution control, and others, have attained a relatively low efficiency. This shows us, first, that there is not sufficient motivation to get committed in a practical way to an environmental problem; and second, that the expression of practical actions must be rooted in deeper levels of knowledge and attitude of the individuals.

The experience as professor of introductory courses of biology and botany of one of us (Federico Pannier) in analyzing the response of university students to the usual evaluation systems of acquired knowledge, convinced us to accept the general principle that "knowledge by itself, without mastering the means for its expression, has no value." In other words, a student perfectly able of recognizing a phenomenon, but unable to describe it, will get frustrated, losing the motivation he initially might have had.

Following this principle, we developed a method which should enable a person previously motivated not only to recognize, under any circumstances, a specific environmental problem, but also to make its description in a precise and ordered manner, according to a sequence of "descriptors." This method, finally, would give him not only a global integrated understanding of the case, but also raise his initiative to conduct environmental actions. We called this method "Phenomenological

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Matrix" and developed it as part of an environmental education textbook written for the National Open University of Venezuela (Ruiz and Pannier, 1978), with the intention of collecting through the participating students general information on the environmental degradation status of the country. Difficulties with the computer evaluation of the information to be obtained through the matrix hindered the application of the method.

Nevertheless, during the last three years, F. Pannier had the opportunity, on a small scale, to apply the method through the participants of the introductory biology course of the faculty of science of the Universidad Central in Caracas. Because of the excellent results obtained, based on a group of 100 students of the third semester belonging to the most diverse scientific orientations such as chemistry, physics, biology and computer science, a description of the matrix and its corresponding guideline seems worthy to present.

Guideline for the Identification and Description of an Environmental Problem

Course: Introductory Biology
Faculty of Science, Universidad
Central de Venezuela, Caracas

"The aim of the present task is to analyze a specific aspect of environmental degradation which could be identified by your own observation of your immediate environment, be it a city, quarter or suburb, university campus, or home garden.

To do this, use the Phenomenological Matrix as a tool for the identification of the problem, which will enable you, once the problem is identified, to proceed with an orderly written description.

Example: Suppose you identify an environmental disturbance by recognizing the presence of abundant foam on the water of the small river which passes near your home. This foam indicates that the water is polluted by detergents. Consequently, observing your matrix under problem unit: water pollution, find out the cause which generates the disturbance, that is: B5 Detergents.

Now follow the horizontal axis, describing with your own words, the scope of the problem according to the descriptors stated: cause, origin, physical environment in which it occurs, area of concentration, etc. By area of concentration, also indicate the name of the river, the exact site where you observed the foam, describing the surroundings as completely as you can.

Under proposed solutions, give information of all the data available, on the type of possible solutions, such as decrees, existing legal ordinances, etc.

Under suggested actions, give your personal opinion as to how the identified disturbance can be resolved or mitigated. For example:

getting the neighbors together to explain to them the problem; trying an individual action like writing a letter to an authority demanding support to solve the problem; performing research on the problem. The actions suggested by you are very important, since they will show your grade of interest and your capacity to undertake an action to improve the environment. Therefore, be very careful in explaining them.

Prepare your report as best and as originally as you can, utilizing references related to the problem, such as maps, newspaper articles, photographs, drawings, etc. Keep your mind open and think! You will find increasing satisfaction in the measure as you proceed in your research."

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The evaluation of the reports was done on the basis of content, presentation and originality of the environmental actions proposed, ranging on a scale of four categories from "excellent" to "regular."

Some representative titles of excellent reports submitted were:

> "Study of the Effluents Discharged to the Venezuelan Coast"
>
> "Industrial Air Pollution, Observed in a Specific Site of the City of Caracas"
>
> "The Water Quality of the Tablazo Bay (Site of a Petrochemical Complex in the Region of Lake Maracaibo"
>
> "Oil Pollution in Lake Maracaibo"
>
> "Garbage Combustion and Its Problems"
>
> "Thermal Pollution, Based on the Thermoelectrical Plant of Tacoa, Near the City of Caracas"
>
> "Degradation of Fauna by Local Urban Developments"
>
> "The Problem of Solid Wastes"
>
> "The Loss of Soil by Fire, Exemplified by the Hills Surrounding the City of Caracas"

We recognize that the method described for the identification and description of environmental problems represents a first coarse approach to enhance environmental awareness, but we plan to develop similar, more specific matrices, adapted to rural and urban environments, which could be properly used by peoples of different levels of instruction.

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ELEMENTS OF "THE PHENOMENOLOGICAL MATRIX"

Problem Units (vertical axis)

A. Air Pollution

- A1. Aerosols (sprays)
- A2. Biocides
- A3. Smoke from garbage combustion
- A4. Carbon monoxide from motor combustion
- A5. Particles from industrial origin
- A6. Dust

B. Water Pollution

- B1. Industrial effluents, chemical
- B2. Industrial effluents, organic
- B3. Domestic effluents
- B4. Oil spills
- B5. Detergents
- B6. Agricultural wastes
- B7. Mining wastes
- B8. Sediments

C. Soil Destruction

- C1. Erosion
- C2. Monoculture
- C3. Drought
- C4. Scarcity of minerals

D. Vegetation Destruction

- D1. Clear-felling (slash)
- D2. Fire (burn)
- D3. Soil impoverishment
- D4. Drought
- D5. Destructive pasture (grazing)
- D6. Landslides
- D7. Disturbing species invasion
- D8. Indiscriminate use of biocides

E. Faunal Destruction

- E1. Hunting
- E2. Destructive fire
- E3. Landslides
- E4. Biocides
- E5. Introduction of disturbing species
- E6. Reduction of the habitat
- E7. Destruction of the vegetation
- E8. Drought
- E9. Food scarcity

F. Solid Waste Accumulation

- F1. Plastics
- F2. Metalic vessels (cans)
- F3. Paper
- F4. Wastes of industrial origin
- F5. Glass

G. Public Health Problems

- G1. Overpopulation
- G2. Deficiency of services
- G3. Overcrowding
- G4. Nutrition deficiency
- G5. Crime increase
- G6. Respiratory diseases
- G7. Neurosis increase
- G8. Cancer
- G9. Narcotics and alcoholism
- G10. Misuse of biocides

H. Irrational Use of Energy

- H1. Thermal pollution
- H2. Noise pollution

Elements Generating Environmental Disturbances (horizontal axis)

A. Causes

1. Man
2. Nature

B. Origin

3. Industrial
4. Public
5. Individual
6. Natural

C. Physical Environment

7. Atmosphere
8. Hydrosphere
9. Lithosphere

D. Areas of Concentration

10. City
11. Forest (artificial)
12. Jungle
13. Mountain
14. Desert
15. Plain

16. Savanna
17. Lake
18. River
19. Beach
20. Sea

E. Resources Utilized

21. Animal
22. Vegetal
23. Water
24. Oxygen
25. Mineral
26. Energy

F. Physical Characteristics

27. Solid
28. Liquid
29. Particle
30. Gas
31. Smoke
32. Spot
33. Deforestation
34. Cracks-fissures
35. Taste
36. Odor
37. Invisible
38. Without Odor

G. Consequences - Biological

39. Animal
40. Vegetal
41. Human health

H. Consequences - Geographical

42. Climate
43. Landscape

I. Consequences - Social

44. Food
45. Housing
46. Income
47. Education
48. Comfort
49. Routine
50. Recreation

J. Actual Condition of the Phenomenon

51. Critical
52. Advanced
53. Middle - midst
54. Minimal
55. Non-existent

K. Responsibility

56. Private sector
57. Public sector
58. Community
59. Individual

L. Proposed Solutions

60. World level
61. National level
62. Local level

M. Suggested Action to the Participant

63. Individual level
64. Community level